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POTENTIAL PRODUCTS FOR UGANDA'S EXPORT EXPANSION AND DIVERSIFICATION

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ABSTRACT

The study identifies the potential sectors and products for export intensification and diversification using the Hausmann Atlas of Economic Complexity and the International Trade Centre's Export Potential Assessment approaches. Overall, the results suggest that Uganda has a comparative advantage for export intensification and diversification in the agricultural, minerals, light manufacturing and textile sectors. In addition, Uganda is exploiting only 62 percent of its potential export market, suggesting that there is a 38 percent unutilized export market that needs to be tapped into. To leverage the available opportunities, the government needs to undertake efforts to enhance the competitiveness of Uganda's export products, primarily agricultural, mineral, light manufacturing and textile products, by improving the economic infrastructure (energy, transport and e-commerce) and addressing institutional inefficiencies (bureaucracy and corruption). In addition, the productive, marketing and exporting capacities of current and prospective exporters need to be built to tap into the regional markets. The government also needs to provide adequate and timely information regarding the available export diversification and intensification opportunities in Uganda's key trading partners. Lastly, tapping into export markets also requires strengthening the existing institutional framework for export promotion to ensure that critical stakeholders are well-coordinated and have a shared vision.

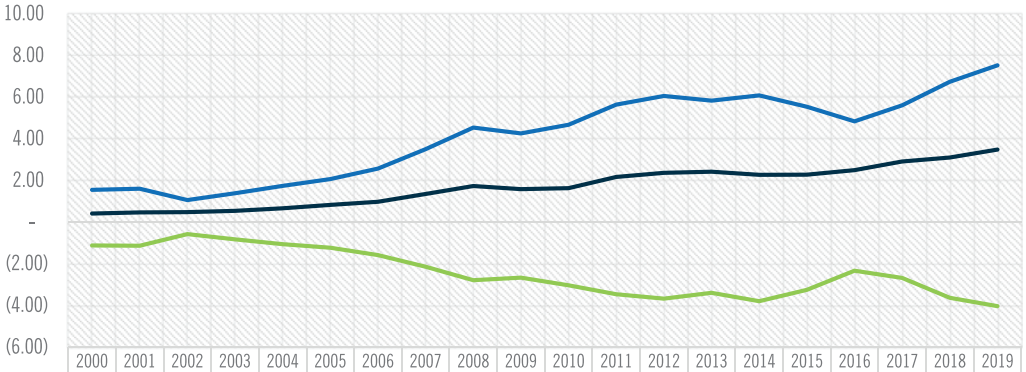
1.0 INTRODUCTION

Uganda has consistently experienced a trade deficit[1]. A trade deficit occurs when there is a mismatch between exports and imports and therefore results in using other means such as borrowing to pay for the imports, which is technically referred to as the current account deficit. Figure 1 details Uganda's trade balance trends, which illustrates the steady widening gap between exports and imports during the last 20 years. In 2019, Uganda's trade deficit amounted to around US$ 4.02 billion. Operating a trade deficit for a prolonged period comes with several associated challenges. Consistent trade deficits may lead to the outsourcing of jobs to other countries. As a country imports more goods than it buys domestically, the home country is likely to create fewer jobs in certain industries. On the other hand, increased demand for foreign goods leads to foreign companies hiring new workers to keep up with the demand for their exports. In extreme cases, trade deficits lead to the depletion of national reserves, which increases the county's vulnerability. There are high chances of foreign exchange fluctuations due to fewer foreign exchange inflows that are not suitable for macroeconomic stability. Although a country may rely on remittances to fill the gap, this is not reliable and is susceptible to the performance and state of the source economies. This explains the decline in remittances following the COVID-19 global pandemic shock.

Uganda mainly exports agricultural commodities and mineral ores, as illustrated in Table 1, and most of these are destined to the regional markets. It is crucial to understand how Uganda can increase the range of products for exports to reduce the trade deficit. Addressing this would partly require deepening the existing markets and exploring new ones to boost the export basket. Uganda's exports largely fetch less revenue in the global market than high technology and value products that the country should strive to diversify into. Even the global share of agriculture commodities and mineral ores is still extremely low. According to the National Planning Authority (2020), the share of Uganda's agro-industrial products in the global market is only 0.17 percent competing with highly integrated countries into the global value chains.

1 A trade deficit is an amount by which the cost of a country's imports exceeds its exports

Figure 1 Uganda's trade balance in US$ (billions)



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Exports	0.40	0.45	0.47	0.53	0.65	0.81	0.96	1.34	1.72	1.57	1.62	2.16	2.36	2.41	2.26	2.27	2.48	2.90	3.09	3.47
Imports	1.54	1.59	1.05	1.38	1.73	2.05	2.56	3.49	4.53	4.25	4.66	5.63	6.04	5.82	6.07	5.53	4.83	5.60	6.73	7.52
Trade balance	(1.13	(1.14	(0.59	(0.84	(1.07	(1.24	(1.60	(2.16	(2.80	(2.68	(3.05	(3.47	(3.69	(3.41	(3.81	(3.26	(2.35	(2.70	(3.64	(4.05

Data Source: ITC Trademap

Table 1 Uganda's average export trade value and proportion between 2001 and 2018 US$ (000)

Code	Product label	Value	%
	All products	1,700,000	100
9	Coffee, tea, maté and spices	369,906	22.16
3	Fish and crustaceans, molluscs and other aquatic invertebrates	120,237	7.2
71	Natural or cultured pearls, precious or semi-precious stones, precious metals,	105,112	6.3
27	Mineral fuels, mineral oils and products of their distillation; bituminous	99,389	5.95
24	Tobacco and manufactured tobacco substitutes	59,830	3.58
15	Animal or vegetable fats and oils and their cleavage products; prepared edible	53,512	3.21
25	Salt; sulphur; earths and stone; plastering materials, lime and cement	52,739	3.16
72	Iron and steel	52,692	3.16
85	Electrical machinery and equipment and parts thereof; sound recorders and	52,048	3.12
17	Sugars and sugar confectionery	51,614	3.09
6	Live trees and other plants; bulbs, roots and the like; cut flowers and	42,913	2.57
87	Vehicles other than railway or tramway rolling stock, and parts and	37,872	2.27
84	Machinery, mechanical appliances, nuclear reactors, boilers; parts thereof	34,839	2.09
7	Edible vegetables and certain roots and tubers	34,516	2.07
41	Raw hides and skins (other than furskins) and leather	30,066	1.8
22	Beverages, spirits and vinegar	29,090	1.74
73	Articles of iron or steel	25,070	1.5
34	Soap, organic surface-active agents, washing preparations, lubricating	22,342	1.34
	Others	**426,213**	**23.7**

Data Source: ITC Trademap

There have been efforts in the past to identify products for export in different national strategies and frameworks. The National Export Development Strategy 2015/16 – 2019/20 (MTIC, 2015) identifies 20 products (the country's top exports) that were initially selected to form the bulk of the priority products that the government wanted to promote for exports. These comprise coffee, iron and steel products, fish and fish products, cement, tea, hides and skins, tobacco, sugar, cocoa, flowers, sesame seed, maize, plastic products, animal and vegetable oils and fats, rice, beans, soap, cotton and fruits and vegetables. The strategy further identifies the available/unutilized market, which gives the market opportunities in the global market place currently served by other countries. The following products were thus identified: cement, coffee, fish and fish products, flowers, iron and steel, sugar, tea, and tobacco, cocoa, cotton, fruits and vegetables, hides and skins, maize, plastic products, rice, and sesame seeds and beans.

The National Export Development Strategy 2015/16 – 2019/20 will soon expire. Besides, the COVID-19 pandemic has significantly reconfigured the import and export landscape to the extent that demand and supply patterns are likely to have changed. This study contributes significantly to the preparation of the next export strategy for Uganda by identifying the country's export potential for intensification and diversification. This has to be done in line with the NDP III programmes, namely agro-industrialization and manufacturing. The specific objective within these programmes is to increase the total export value of processed agricultural commodities and increase the share of manufactured exports to total exports from 12.3 percent to 19.8 percent. From theory, it is believed that exports play a significant role in the economy. It is envisaged that when exports grow, they increase the chances of creating employment. In Uganda, traditionally, export-related jobs have been in the agricultural sector, characterized by limited job creation, especially when there is little value addition. By identifying and expanding exports, the chances are that more value addition will follow suit,

leading to employment creation. It is also anticipated that rising exports generate aggregate demand and cause higher economic growth. This is likely to result in a knock-on effect on related service industries. Finally, the strength of exports has high chances of improving the current account deficit, which has deteriorated in the last three decades.

1.2 Objectives

The main objective of this study is to contribute to the increase of Uganda's volume and value of exports by identifying export products and sectors for intensification and diversification. As a result, this is intended to increase the country's exports and narrow the persistent trade deficit. Specifically, the study sought to:

i. Identify and spot Uganda's products and sectors with export potential in existing and new markets based on detailed trade and market access statistics; and
ii. Identify and assess the chances of export success of products not currently exported by Uganda or have marginal export potential. Basically, what else can Uganda export?

1.3 Policy motivation

The paper will significantly contribute to the formulation of the next national export development strategy by identifying products and sectors for investment. It specifically points out the products for export expansion and delves into new potential products with a high likelihood of joining the export basket. Overall, this will be responding to the NDP III objective of increasing export revenue for Uganda.

2.0 LITERATURE REVIEW

2.1 Introduction

This section provides a brief review of the theoretical and empirical literature on the key export intensification and product diversification approaches which include the (i) gravity model, (ii) product space, (iii) Decision Support Model and (iv) Export Potential Map of the International Trade Centre. In addition, the empirical literature provides evidence on the application of these approaches in various export intensification and diversification studies. This literature section concludes with the literature review summary while highlighting the knowledge gap for Uganda and how the study intends to close it.

2.1 Theories on the identification of products and sectors

Since the abandonment of autarky centuries ago, countries have exponentially developed export trade, especially with the exploitation of technology advancement, innovation, infrastructure development, specialisation, and scale economies. The preoccupation of all countries is developing market access for their products, penetrating old markets and increasing market access worldwide. Under the World Trade Organization (WTO), nations have developed rules to reduce non-tariff barriers, improve trade facilitation and lower tariffs, and increase trade among themselves. Countries engage in and implement policies aimed at improving the efficiency of border procedures, harmonizing regulations on products and services, and increasing transparency of these rules to create an environment conducive to exports. In addition, countries set up specialized agencies, seek developmental aid and negotiate trade rules that are not sector-neutral.

A country's efforts and strategies, among others, determine the level of participation in the global export and import trade. According to (Cheong, Decreux and Spies, (2018), different channels exist through which developing countries can benefit from exports. For

example, enabling companies and sectors to reach their optimal size by going beyond the domestic market, taking advantage of price differences between local and international markets to increase profits and national income; and taking advantage by upgrading technologically. Thus, exporting can trigger structural transformation and the development of value-added. This implies that the role of export trade is critical in the development process, and countries use all the available and existing frameworks, policies, technology, treaties to further this agenda.

Thus, the question is about what criteria should countries use to develop a list of export products and sectors to achieve this objective. Literature cites different criteria for the selection of sectors for industrial or trade promotion. Noland (2004) underlines the importance of inter-industry linkages and, thereby, the capacity of selected sectors to generate growth in the rest of the economy. Lederman and Maloney (2012) argue for externalities and rents. This justifies interventions to encourage goods with positive externalities and rents more than the market would naturally do. Therefore, the rationale for selecting sectors is increasing returns to scale at the sector level. Given that externalities are difficult to measure, they may not be used to determine which sectors or products to target in practice. For that reason, Hausmann, Hwang and Rodrik (2007) argue for specialization patterns to determine the economic growth of countries and, therefore, exports. In the pursuit of export promotion, institutions have developed different approaches to determine export potential.

The idea of examining the country's potential for export intensification and diversification started with the seminal work of Tinbergen (1962) and Pöyhönen (1963), who attempted to explain bilateral trade flows using Newton's law of universal gravitation. The gravity model's fundamental proposition is that trade flows between countries are mainly defined by countries economic size (represented by their Gross National Product) and the physical distance between countries (representing transportation costs). Therefore, potential trade flows (export intensification and diversification) between countries are expected to increase if they have strong economies and the geographical distance between them is small. Thus, the gravity model provides valuable insights into the relationship between the direction and bilateral trade volume. However, the approach overlooks the countries comparative advantage, economies of scale and the role of globalisation in reducing trade costs. Further, Decreux and Spies (2016) argue that cross-country and cross-sector specifications of in-sample gravity estimations are computationally burdensome because they require the estimation of an enormous amount of coefficients. In addition, the source of the potential export value remains unclear (Decreux and Spies, 2016).

The other strand of literature is the decision support model (DSM), which was proposed by Cuyvers, De Pelsmacker, Rayp and Roozen (1995). This model uses a screening procedure to guide public and private export promotion institutions to plan and assess export promotion activities. The model consists of four consecutive filters to select the opportunities that should be prioritised in export promotion strategies. In filter 1, countries that lack a sufficiently large growth of their economies to provide possibilities for exports are eliminated. In filter 2, the remaining countries that are not adequately interesting as export promotion targets based on product-related criteria (short-term growth of imports, long-term growth of imports, and relative size of imports) are eliminated. In filter 3, the remaining possible opportunities are studied in detail by considering the degree of market concentration and trade restrictions to eliminate countries that are not easily accessible or for which the profit potential is too limited and/or too uncertain. Lastly, filter 4, the country's export position is assessed based on the strengths and weaknesses of its businesses vis-a-vis the markets in the list of potential opportunities. Therefore, the country's market share in each product country is compared to the market shares of the largest competitors. Markets for which the country has apparent strengths will be on top of the list of priorities to concentrate on international marketing efforts.

The product space theoretical framework has also been advanced to explain how countries can diversify their exports. Earlier studies also focus on the consequences of the product space concept for the structural transformation process and comparative advantage patterns of counties (Hausmann & Klinger, 2006). This approach postulates that producing new products is different from producing more of the same since each product requires specific inputs such as knowledge, physical assets, and intermediate inputs. Consequently, the assets and capabilities needed to produce one good are imperfect substitutes for those needed to produce other goods, but the degree of asset specificity varies widely (Hausmann & Klinger, 2006). In addition, this suggests that the speed at which countries can transform their productive structure and upgrade their exports depends on the density of the product space near the area where each country has developed its comparative advantage. This implies that countries can easily diversify their exports into new products if they are frequently exported together with the country's produce (Decreux & Spies, 2016).

The more recent export potential assessments by the International Trade Centre (ITC) build on the previous theoretical approaches to identify opportunities for export intensification and diversification (Decreux & Spies, 2016). The ITC export assessments consist of two indicators, i.e. Export Potential Indicator (EPI) and Product Diversification Indicator (PDI). These assessments are premised on the assumption that trade flows between countries are influenced by supply performance, export demand and easiness to export, holding factors like trade frictions constant. The EPI is based on a structural gravity model that identifies export potential values from supply capacities in the exporting country, demand conditions in the target market and bilateral linkages between the two. Therefore, the EPI provides information on the export potential for established export products to existing and/or new markets.

On the other hand, the PDI builds on the product space approach by Hausmann and Klinger (2007) by considering other factors such as easiness to export and export demand. Adding these two factors to the product space framework ensures that the identified products for export diversification have prospects for success in potential target markets (Decreux & Spies, 2016). Therefore, the PDI provides information on new export products that face favourable demand conditions in either existing or new markets.

The many approaches to identifying export potential in the literature can be collapsed into two main strands of outcomes (Cheong, Decreux and Spies, 2018). The first strand is identifying products in which the exporting country has already proven to be internationally competitive and which goods have prospects of export success in specific target markets (intensive product margin). The second strand identifies products that the exporting countries do not yet export competitively but seem feasible on the country's current export baskets of similar countries (extensive product margin).

2.2 Empirical literature

The idea of employing the gravity model to empirically analyse the export potential of several countries has been explored in the literature. Zhang and Wang (2015) use data from 1999 to 2013 to examine China's export potential to 10 member states of the Association of Southeast Asian Nations (ASEAN). They use an augmented gravity model with the new economic mass proxies that were proposed by Baldwin and Taglioni (2014) to estimate China's bilateral export value to ASEAN and the export potential[2]. They find that, between 2011 and 2013, China had fully maximised its potential in Singapore, Malaysia and Lao PDR; moderately utilised its potential in the Philippines, Thailand and Viet Nam and still had a substantial untapped export potential in Brunei Darussalam, Indonesia, Cambodia and Myanmar. Abbas and Waheed (2015) also use data from 1991 – 2011 to examine the macroeconomic determinants of trade flows and the export potential for Pakistan. They use

2 To get the export potential (represented as the export potential index), they divide the actual observed value of China's export to ASEAN by this estimated value. They use Liu and Jiang (2002) classification of trade potentials, with values smaller than 0.8 representing huge export potential; values between 0.8 and 1.2 representing moderate potential and values greater than 1.2 representing exhausted potential.

an augmented gravity model to identify the potential markets[3] for export diversification in 40 countries selected from Asia, the Middle East, America, Europe, Africa and Oceania. The results indicate that Pakistan has high export potential with Japan, Singapore, Indonesia, Mexico, New Zealand and Australia. On the other hand, its export potential has been exhausted in Hong Kong, China, Saudi Arabia, United States, Kenya and Belgium. Notably, countries where export potential has been fully utilised or exhausted can still identify and cultivate new influencing factors to promote more export trade.

Some studies have used the decision support model to identify the export promotion institutions in the planning and assessing export promotion activities. For instance, Ferreira and Steenkamp (2020) identify the trade potential opportunities between 26 selected countries in the African Tripartite Free Trade Area (TFTA). The study matched the import demand and export supply for different countries to identify the export country-product-import country combinations with trade potential by calculating how the values of existing exports changed between 2010 and 2014. The results show that about 334 matches were identified, and about 260 (78 percent) intra-regional trade opportunities between TFTA countries were underexploited or unexploited. Furthermore, the study identifies the top categories for boosting trade, including vegetable products, foodstuffs, metals, textiles and animal and animal products. Steenkamp and Viviers (2012) also use the DSM approach to identify export opportunities for South Africa in the rest of Africa[4]. They identify about 2,986 product-country combinations that promise immense export opportunities for South Africa, with the Eastern Africa region having the highest export potential (about 50 percent). However, country-level results indicated that Nigeria, Namibia and Ghana presented the highest export potential opportunities. Lastly, the sector level analysis revealed that the mineral products, metals, transportation, chemicals, and allied industries had the highest export potential. The study concludes that the qualitative DSM results should complement qualitative information concerning each product-country combination to deliver optimal results.

The other strand of empirical literature employs the product space concept. Singh, Gupta, Sudan and Singh (2018) use the product space approach to identify India's potential products to harness for export expansion and diversification. Using data for 2016, they rely on decision criteria including distance, density, revealed comparative advantage (RCA), opportunity gain and productivity complexity index (PCI) to identify the strategic sectors and products. Results indicate that the top three non-agricultural sectors for promoting and diversifying exports are Mineral Fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes, Organic chemicals and Pharmaceutical products, while the agricultural products are Meat and edible meat offal, fish and crustaceans, molluscs and other aquatic invertebrates and cereals. On the other hand, the top three non-agricultural products are Granite, crude or roughly trimmed, Zinc oxide and peroxide and Pre-shave, shaving and after shaving preparations while the agricultural products are Onions and shallots, fresh or chilled, Coconuts, fresh or dried and Tea, green (unfermented) in packages $<$ 3 kg. Obeng (2020) uses the product space approach to determine the possible products that Ghana can diversify. Their analysis focuses on criteria such as distance, opportunity gain and productivity complexity index. By filtering through products at four levels[5], the study identified agro-processing and light manufacturing activities (textiles, pharmaceutical products, simple machinery and construction materials) as crucial sectors for Ghana's diversification drive. In providing insights on the products that Uganda can leverage

3 To obtain the export potential values, the forecasted export value is divided by the actual export value. According to this framework, export potential values (i) greater than one denote untapped potential and (ii) less than one denote exhausted potential.

4 See other South African papers that focused on export opportunities (products only) in Brazil, India and China (Pearson, Viviers, Cuyvers, & Naude´, 2010) and combined both services and products in export potential assessments (Grater, Steenkamp, Viviers, & Cuyvers, 2014)

5 The study started by eliminating all the products with RCA from the dataset, followed by selecting from the remaining products, those with PCI greater than the mean PCI (0.56). At the third stage, products with an Opportunity Gain greater than zero were included in the set and lastly, products with a distance greater than the median distance (0.97) were eliminated.

for growth through export diversification, Hausmann, Cunningham, Matovu, Osire and Wyett (2014) use distance, complexity and opportunity gain criteria. The study also identifies binding policy and institutional constraints that need to be addressed to exploit export diversification opportunities.

Lastly, other empirical studies have used the export potential assessments framework developed by the ITC. For example, ITC (2018) uses the export potential indicator (EPI) and product diversification indicator (PDI) to identify products for intensification and diversification. Razzaque, Rahman and Akib (2019) use the EPI to identify export intensification opportunities for Bangladesh in China. The study finds that Bangladesh has utilised about 30 per cent of its current export potential in China. Furthermore, products such as clothing items and leather products, leather, footwear, jute, and frozen fish items had the greatest export potentials.

In conclusion, different approaches examining export intensification and diversification have been advanced by various scholars over the past decades. Whereas these approaches yield interesting results for both academic and policy purposes in identifying promising export markets, their findings should be interpreted with caution. Other important considerations need to be taken into account. In other words, decisions regarding export promotion activities should not be solely based on the results of these models, but they should consider other factors. Empirically, several studies have used different approaches and methodologies to identify export intensification and diversification opportunities for different countries. For Uganda, studies that have attempted to identify Uganda's export potential have used the gravity, and the product space approaches. This study contributes to the literature by examining the potential products for export intensification and diversification using ITC's Export Potential Assessment and the Atlas (Product space) frameworks.

3.0 METHODOLOGY

3.1 Analytical framework

The analysis benefits from the export potential assessment methodologies developed by the International Trade Centre (ITC) and the Harvard School of Kennedy (Atlas of economic complexity). In seeking to increase the basket of products for exports, the concept of product space[6] , as Hausmann, Hwang & Rodrik (2007) proposed, was used to enhance product identification for intensification and diversification. This approach argues that existing capabilities are leveraged to grow and diversify the country's exports.

Conceptually, export potential assessments are based on the assumption that in a world without frictions, trade flows can be described as a combination of supply performance, easiness to export and total demand (Decreux & Spies, 2016). While a country's capacity to supply existing products is captured through projected market shares, its capacity to diversify into new products relies on Hausmann and Hidalgo's concept of the product space (Hausmann and Klinger, (2007), Hausmann. Hwang and Rodrik, (2007) and Hidalgo, Klinger and Barasi, (2007) establish links between products by assessing how frequently they are found together in the export baskets of countries. Based on detailed trade and market access information, the methods enable identifying existing products with high export potential and/or diversification opportunities in a given target market. Therefore, EPI and PDI indicators will be used.

The EPI serves where a country targets already established export sectors to increase their exports to new or existing target markets. It identifies products in which the exporting country has already proven to be internationally competitive and has good prospects of export success in the specific target market(s) (intensive product margin). The EPI is based on a structural model that identifies potential export values

6 The Product Space is a network representation of the relatedness or proximity between products traded in the global market. It is a network that formalizes the idea of relatedness between products traded in the global economy

from supply capacities in the exporting country, demand conditions in the target market and bilateral linkages between the two (Decreux & Spies, 2016). It is argued that any gap between what countries could export and what they do export results from factors that should be addressed, such as the lack of information about the rules and regulations of the target market or difficulties in complying with them or in meeting the (quality) preferences of its consumers.

The PDI serves were a country targets to diversify and develop new export sectors that face promising demand conditions in new or existing target markets. It identifies products that the exporting country does not yet export competitively but could be feasible based on its current export basket and the export baskets of similar countries (extensive product margin). The PDI is based on the concept of the product space. This approach improves the purely outcome-based measure of linkages to new products by accounting for natural endowments that are pivotal for the capacity of a country to produce certain products (Decreux and Spies, 2016). It combines the product space strength of being supply-side with demand and market access information. It presents rankings of diversification opportunities in a given country or regional market.

3.2 The International Trade Centre approach

3.2.1 Export Potential Indicator

The approach to estimating export potential is borrowed from the gravity model specification. However, this is done at the product level and not at the national level. It is assumed that in a frictionless world, trade flows could be described by a combination of exporter × product, importer × product and exporter × importer factors, which is conveniently expressed as in equation 1

$$v_{ijk} = \alpha_{ik}\beta_{ij}\gamma_{jk} \quad (1)$$

where v_{ijk} corresponds to exports from exporter i (Uganda) of product k to market j. The parameter α_{ik} describes exporter i's performance in exporting product k, γ_{jk} market reflects j's demand for product k and β_{ij} the easiness to export any good from i to j. Ideally, equation (1), when estimated econometrically, would help give us the differences between fitted and actual values that can be interpreted as the unused potential. However, at a product level, this is not practical. Give this challenge, Decreux and Spies (2016) argue that export potential assessments take a different approach and infer potential export values at ijk level from a multiplicative model based on two-dimensional data.

3.2.2 Product diversification Indicator

The identification of existing opportunities is made by linking a country's current comparative advantages to potential new ones by using the product space concept as propounded by (Hausmann and Klinger, 2007, Hausmann *et* al., 2007 and Hidalgo et al., 2007). The average distance of a product from a country's current export basket replaces market share to measure supply capacities. Demand and easiness remain identical. The PDI starts from a country's existing supply capacities but aims to identify – based on these capacities – products that the country could diversify (Decreux and Spies, 2016). This is premised because a country's ability to export one product depends on its ability to export other products (product space). This concept measures the relatedness of products (proximity) based on the observation that similar products are more likely to be produced by the same country than different products. It is argued and assumed that countries possess a set of capabilities specific to the production of their exported goods. When the overlap between this set of capabilities and another set specific to a new product is high, the country increases the likelihood to diversify its exports. Therefore, according to Hidalgo and Hausmann (2007), if country i is currently able to export product l that is often found in the export baskets of other countries and another product k, it will be relatively easy for country i to "jump" also to product k.

3.3 The Haussmann approach

3.3.1 Distance

Haussmann (2007) defines distance as a measure of a location's ability to enter a specific product. The product's distance is measured on a scale of 0 to 1. It captures the extent of a location's existing capabilities to make the product measured by how closely related a product is to its current exports. Countries move through the product space rationally and empirically by developing goods close to those they currently produce. The nearer a product is to the current exports implies that it requires related capabilities to existing, with a greater likelihood of success in the export market. This is based on the argument that every two products have a distance between them, where products that require similar know-how and capabilities are 'closer together (i.e. shorter distance, closer to 0), while two products that require completely different capabilities are 'farther' apart (i.e. longer distance, closer to 1). In this case, more considerable distances express little relatedness to existing know-how and the need to coordinate, adding many missing capabilities and inputs to enter production. Every two products have a globally defined *proximity* between them as measured by the probability of co-export. If a country exports product A, what is the probability they also export product B?. The product proximities are fixed globally and measured using 128 countries' export data over 50 years. The *distance* of a product is then the sum of the proximities connecting that product to all the products that the location is not currently exporting. Formally, for product *p* and country *c*, the distance *d* is:

$$d_{cp} = \frac{\sum_{p'} \left(1 - M_{cp'}\right) \Phi_{p,p'}}{\sum_{p'} \Phi_{p,p'}} \qquad (2)$$

M_{cp} is the matrix summarizing which country makes what and it is used to construct the product space and the measures of economic complexity for nations and products.

3.3.2 Product complexity index

The product complexity index (PCI) ranks the diversity and sophistication of the productive know-how required to produce a product. PCI is calculated based on how many other countries can produce the product and the economic complexity. Therefore, the PCI captures the amount and sophistication of know-how required to produce a product. It has been established empirically that the most complex products, dominated by a few countries, include sophisticated machinery, electronics, and chemicals compared to the least complex products such as raw materials and simple agricultural products. Specialized machinery is complicated as it requires a range of know-how in manufacturing, including the coordination of a range of highly skilled individuals' know-how. For example, in 2018, tin ores and concentrates had the least PCI of -3.3 and photographic plates and film, exposed and developed, other than the motion-picture film, had the highest PCI of 2.56. The PCI is determined by calculating the average diversity of countries that make a specific product and the average ubiquity of the other products these countries make. The PCI is defined as:

$$M^{P}_{p,p} = \sum_{c} \frac{M_{cp} M_{cp'}}{k_{c,0} k_{p,0}} \qquad (3)$$

3.3.3 Opportunity outlook Gain

Measures how much a location could benefit in opening future diversification opportunities by developing a particular product. It quantifies how a new product can open up links to more and more complex products and classifies the strategic value of a product based on the new paths to diversification in more complex sectors that it opens up. It accounts for the complexity of the products not being produced in a location and the distance or how close to existing capabilities that new product is and is defined as:

$$OG_{cp} = \left[\sum_{p'} \frac{\Phi_{p,p'}}{\sum_{p''} \Phi_{p'',p'}} \left(1 - M_{cp'}\right) PCI_{p'} \right] \qquad (4)$$

The term M_{cp} counts only the products that the country is not currently producing. Higher opportunity outlook gain implies that a product is in the vicinity of more

products and more complex products.

3.3.4 Revealed Comparative Advantage (RCA)

A measure of whether a country is an exporter of a product, based on the relative advantage or disadvantage a country has in exporting a certain good. A country is an effective exporter of a product if it exports more than its "fair share" or a share that is at least equal to the share of total world trade that the product represents (RCA greater than 1). Formally, if *Xcp* represents the exports of product P by country C, we can express the RCA that country C has in product P as

$$RCA_{cp} = \frac{X_{cp} / \sum_{c} X_{cp}}{\sum_{p} X_{cp} \sum_{c} \sum_{p} X_{cp}} \qquad (5)$$

We can use this measure to construct a matrix that connects each country to the products that it makes. Entries in the matrix are 1 if country C exports product P with RCA greater than 1, 0 otherwise. Thus, *Mcp* is the matrix summarizing which country makes what and is used to construct the product space and the measures of economic complexity for countries and products.

3.4 Data Sources

The study used data from different sources to conduct the analysis, including Trademap, Economic Atlas, and International Trade Centre.

4.0 RESULTS

The section presents the study's findings by first examining the macro-level analysis of the indicators analyzed and proceeding to give details of the same at a granular level, specifically product level. The section is divided into two main subsections: the export potential and the export diversification aspects of the results. Finally, we endeavour to point out the methodology used to generate the results: the ITC and the Atlas of economic complexity.

4.1 Export Potential at the sector level

The following results were generated using the Atlas of economic complexity, which discusses the distance, product complexity index, opportunity gain and the revealed comparative advantage indicators at the macro level. The distance indicator is between zero and one, where values close to zero indicate the ease of producing another product and, towards one, the difficulty in producing a given product owing to existing technological know-how. Table 2 shows that the values for all the sectors are above 0.8 on average, which implies that producing other related products using technologies of existing products is difficult for Uganda. Notwithstanding this position, it is observed that it is more difficult to shift production among electronics and machinery sectors (with an average of

Table 2 Sector performance according to the distance indicator

	2015	2016	2017	2018	Average
Agriculture	0.84	0.82	0.85	0.84	0.84
Chemicals	0.88	0.86	0.89	0.88	0.88
Electronics	0.9	0.88	0.9	0.9	0.90
Machinery	0.9	0.88	0.9	0.9	0.90
Metals	0.88	0.86	0.88	0.88	0.88
Minerals	0.84	0.82	0.85	0.84	0.84
Stone	0.88	0.86	0.88	0.88	0.88
Textiles	0.86	0.85	0.87	0.86	0.86
Vehicles	0.88	0.86	0.88	0.88	0.88

Data source: Authors' computation using Atlas of Economic Complexity.

0.9 and closer to 1) than in agriculture and minerals (0.84). In other words, Uganda has achieved some degree of comparative efficiency to produce and export agricultural and mineral products. Overall, the distance indicator is high with a tendency towards 1, suggesting less flexibility and ease to move from one product to another for all sectors in Uganda.

Ideally, the PCI should be positive and high to suggest high diversity, sophistication and production know-how. Table 3 shows that Uganda's PCI is between -1.04, being the lowest and 0.87, being the highest value giving us the diversity and sophistication of productive know-how required to produce a product. This is in comparison to some countries that have a PCI as high as 3. The results thus suggest that Uganda has limited diversity, is less sophisticated and has low technical know-how. Whereas, on average, the agriculture, minerals and textiles sectors have negative and lower PCIs suggesting that they need limited diversity and sophistication to produce; chemicals, machinery, electronics have higher PCIs, thus require high diversity and sophistication. Considering the degree of complexity and sophistication in production, Uganda is best placed to invest in agriculture, minerals and textiles in the short run. It builds its diversity and sophistication in the production of other products such as electronics and machinery.

Given that higher opportunity gain implies that a sector is in the vicinity of more products that are more complex, Table 4 suggests that on average, agriculture, minerals and textiles should form the bulk of products for export promotion. This is because machinery, electronics, vehicles, chemicals have higher opportunity gain values and, therefore, are more complex to produce. Note that investing in sectors with higher opportunity gains is likely to increase the chances of going into more complex products.

Table 3 Sector performance according to the product complexity index indicator

	2015	2016	2017	2018	Average
Agriculture	-0.45	-0.49	-0.49	0.55	-0.22
Chemicals	0.51	0.48	0.52	-0.50	0.25
Electronics	0.84	0.84	0.85	0.55	0.77
Machinery	0.83	0.87	0.83	0.84	0.84
Metals	0.42	0.46	0.43	0.38	0.42
Minerals	-0.96	-0.92	-0.94	-1.04	-0.96
Stone	0.35	0.32	0.27	0.40	0.33
Textiles	-0.50	-0.49	-0.46	-0.43	-0.47
Vehicles	0.36	0.43	0.35	0.22	0.34

Data source: Authors' computation using Atlas of Economic Complexity

Table 4 Sector performance according to the Opportunity gain indicator

	2015	2016	2017	2018	Average
Agriculture	0.36	0.35	0.37	0.35	0.36
Chemicals	0.81	0.82	0.8	0.79	0.81
Electronics	0.95	0.98	0.97	0.92	0.96
Machinery	0.94	1	0.97	0.95	0.97
Metals	0.18	0.76	0.78	0.74	0.62
Minerals	0	0.21	0.19	0.16	0.14
Stone	0.69	0.71	0.7	0.68	0.70
Textiles	0.29	0.31	0.3	0.31	0.30
Vehicles	0.79	0.83	0.83	0.75	0.80

Data source: Authors' computation using Atlas of Economic Complexity

Revealed comparative advantage ranges between zero and one, where values close to zero indicate a lower RCA and values close to 1 have a higher RCA. Table 5 shows results with a stronger tendency towards zero, suggesting a low revealed comparative advantage. This implies that Uganda is not competitive at the global level, given that across all the sectors, the RCAs are below 0.2, a tendency toward zero. On average, Uganda has the highest RCA in agriculture of 0.15, with the rest at 0.08. The re-exports of products can explain the seemingly high RCA for vehicles in that sector to South Sudan and the Democratic Republic of Congo, among others. Note that Uganda being a small country and an insignificant contributor to global trade, is not likely to have high RCA values. This implies that even if the RCAs are low, we can identify sectors with high prospects at a comparative level among the sectors.

4.2 Uganda's Export Potential at the product level

This subsection presents Uganda's actual exports against the potential exports to establish the gap between them using the ITC methodology. The gap (untapped potential) between them is explained by several factors, including tariffs, transport costs, information asymmetry, and non-tariff barriers. Countries strive to narrow the gap between the actual exports and potential exports. The subsection further presents Uganda's exports at the product level (HS4) by establishing the export values, the total world trade, Uganda's share, the revealed comparative advantage and the top three to five export destinations.

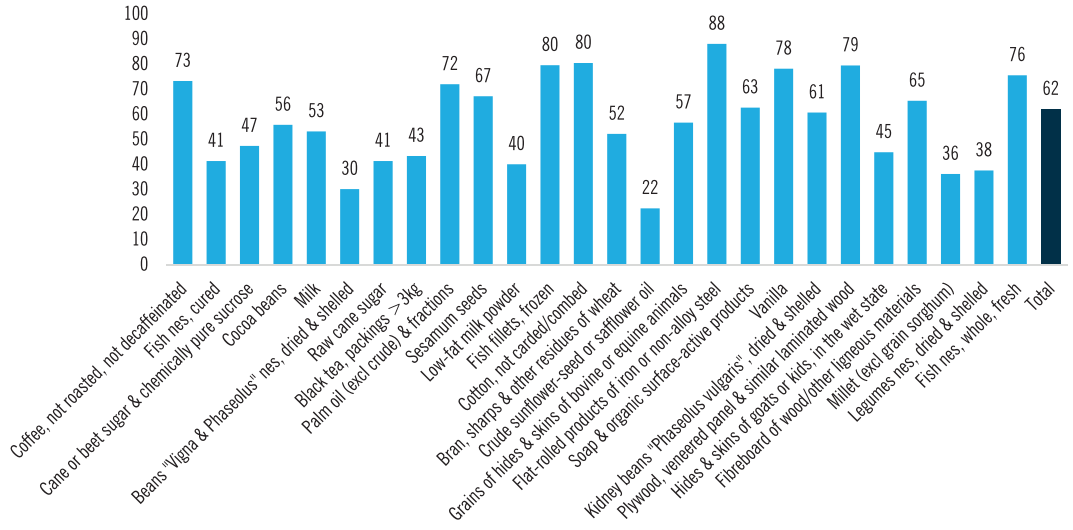
Figure 2 provides the performance of Uganda's actual exports concerning its export potential. This is

Table 5 Sector performance according to the Revealed Comparative Advantage indicator

	2015	2016	2017	2018	Average
Agriculture	0.14	0.17	0.14	0.13	0.15
Chemicals	0.11	0.08	0.07	0.07	0.08
Electronics	0.09	0.08	0.06	0.07	0.08
Machinery	0.09	0.08	0.07	0.07	0.08
Metals	0.08	0.11	0.07	0.08	0.09
Minerals	0.13	0.08	0.08	0.04	0.08
Stone	0.06	0.08	0.09	0.07	0.08
Textiles	0.09	0.09	0.07	0.05	0.08
Vehicles	0.11	0.19	0.14	0.14	0.14

Data source: Authors' computation using Atlas of Economic Complexity

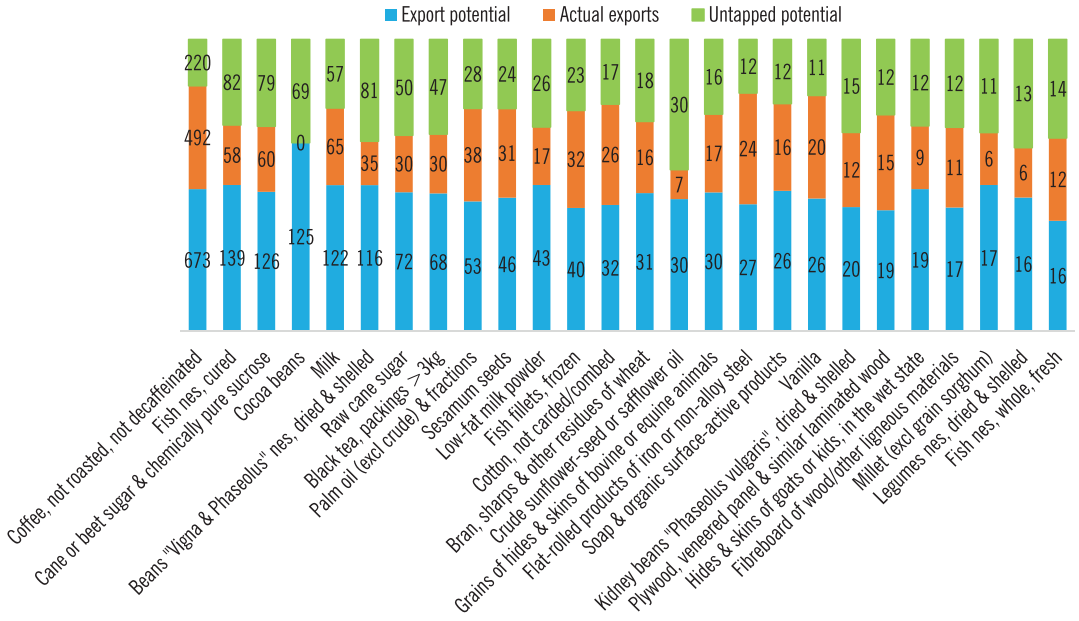
Figure 2 Performance of Uganda's top export products (%)



Data source: International Trade Centre's Export Potential Map (2021)

Coffee, not r

Figure 3 Potential for Uganda's products US$ millions



Data source: International Trade Centre's Export Potential Map (2021)

given in terms of proportions of actual export for the top 26 export products about the potential exports. On average, Uganda exploits only 62 percent of its potential export market, suggesting that there is a 38 percent unutilized export market that needs to be tapped into. More specifically, products like cured fish, cane or beet sugar, beans, raw cane sugar, black tea, low-fat milk, crude sunflower, hides and skins, millet, and legumes only exploit less than 50 percent of the available market potential. On the other hand, coffee, palm oil, fish fillet, cotton, flat-rolled steel, vanilla, plywood are exploiting more than 70 percent of their market potential. Therefore, Uganda can increase its export revenue by striving to increase its exports beyond the current proportions.

Furthermore, Figure 3 below shows the export potential, actual exports and untapped potential for Uganda's top 26 products in value terms. For example, on average, over the past five years, coffee's export potential was US$ 673 million, but actual exports were about US$ 492 million.

This implies that Uganda has an untapped potential of about US$ 220 million for coffee exports. It emerges that the top 26 products' untapped potential is worth about US$ 1 billion. To tap into this unutilized potential, Uganda will need to address the impediments to trade that were previously outlined.

Tables A1 to A6 in the annex provide details on Uganda's value of exports in US$, world trade value in US$, Uganda's share of global trade, RCA and top export destinations at a product level for the following sectors: agriculture, chemicals, metals, minerals, stones and textiles. The agriculture sector earns Uganda the highest value of export revenue and has the highest RCA, largely above 0.7. However, like the rest of the sectors, the country's share of the given products is minimal at the global level. This implies that an increase in the exports of these specific products may not make a significant change at the international level. The rest of the world can still absorb a substantial amount of exports from Uganda with no difficulty. This arises from the fact that Uganda is a small economy with a dismal impact on global production. Notwithstanding, this provides the country with a significant share of the global market. The current export market destinations are primarily the East African Community Partner States, the Common Market for Eastern and Southern Africa Member States, the European Union, and few Asian and Middle East countries. Tapping into the

current export potential would mean that Uganda has to look at the existing export destinations.

4.3 Export diversification

This section presents the results of products and sectors with potential for export diversification. This is done by linking Uganda's comparative advantages to potential new ones by using the product space concept. The findings are presented based on the different indicators explained in the methodology: RCA, distance, opportunity gain, and productivity complexity index. Finally, all these indices are combined into a composite index that we create through a normalization process. The process identifies each index and the composite index of the top 25 products for potential diversification by Uganda.

4.3.1 The Revealed Comparative Advantage

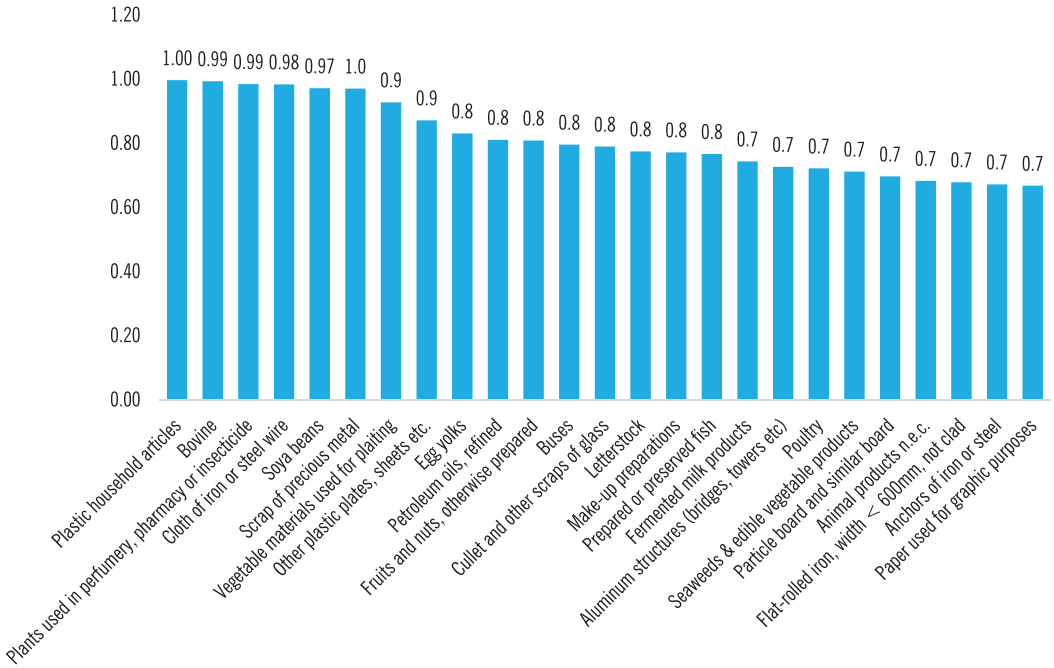
Figure 4 presents the top 25 products for export diversification using the RCA indicator. Overall, the results suggest that Uganda has export potential in processed agricultural and light manufactured products. These include plastic household articles, bovine, plants used in the perfumery, cloth of iron or steel wire, soya beans, the scrap of precious metals, vegetable materials, egg yolks, petroleum oils, fruits and nuts, fermented milk products, poultry, edible oils and some steel products among others. This implies that Uganda can invest in these products for export with ease, given that the country has a significant comparative advantage in their production.

4.3.2 The distance indicator

Figure 5 presents the top 25 products for export diversification using the distance indicator/criterion. Results suggest that Uganda has export potential in light manufactured products and agricultural products.

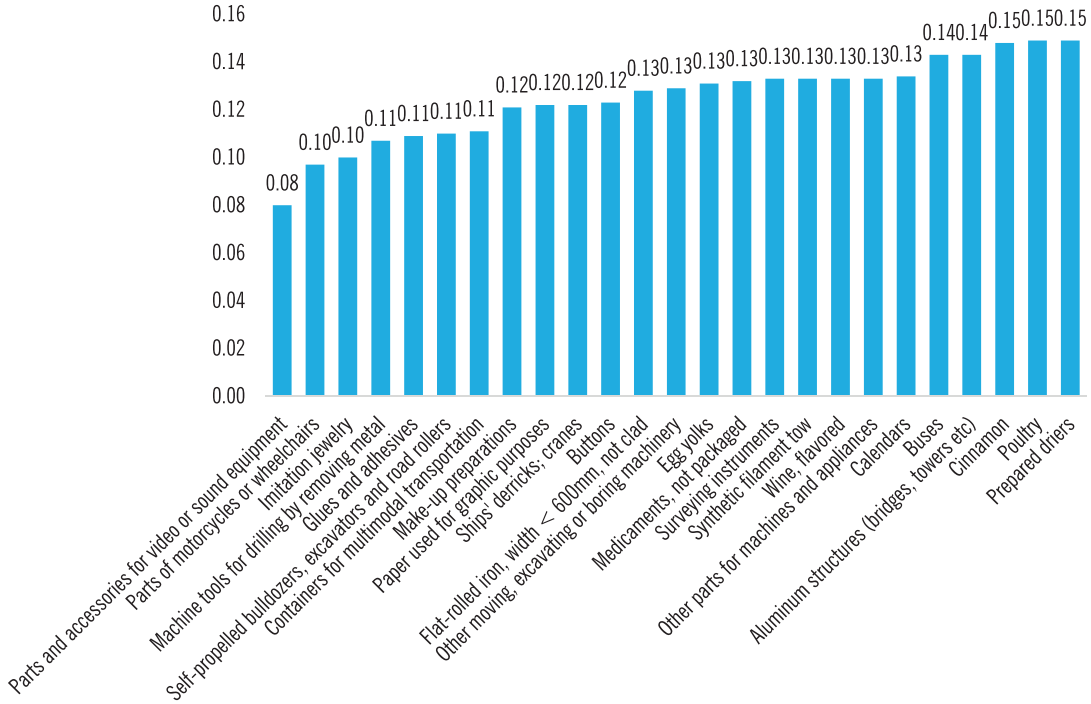
These include; parts and accessories for videos, parts of motorcycles or wheel chairs, imitation jewellery, machine tools for drilling, glues and adhesives, make-up preparations paper used for graphic purposes,

Figure 4 Top 25 products for export diversification according to the Revealed Comparative Advantage



Data source: International Trade Centre's Export Potential Map (2021)

Figure 5 Top 25 products for export diversification according to the distance indicator



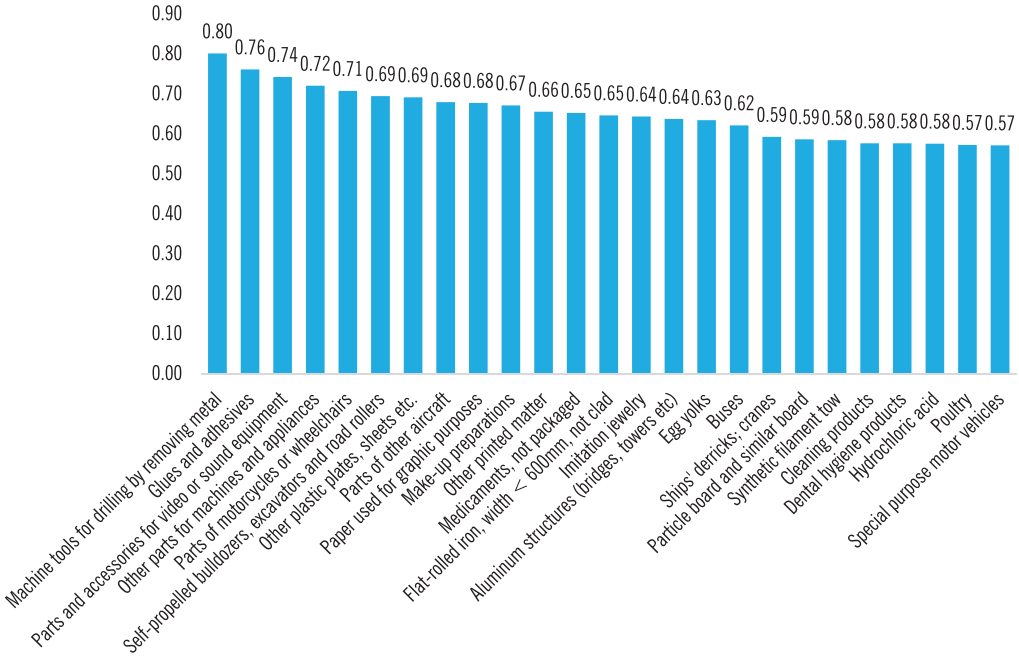
Data source: International Trade Centre's Export Potential Map (2021)

buttons, medicaments, egg yolks and poultry, among others. The distance ranges from as low as 0.08 to as high as 0.15 for the top 25 products. This suggests high density, that is, products that are relatively easier to produce/export given that distance is small.

4.3.3 The Product Complexity Index

Figure 6 presents the top 25 products for export diversification based on the productivity complexity index indicator. Results suggest that Uganda has more export potential in light manufactured products than

Figure 6 Top 25 products for export diversification according to productivity complexity index



Source: International Trade Centre's Export Potential Map (2021)

agricultural products. These include machine tools for drilling, glue and adhesives, parts and accessories, other parts for machines, parts of motorcycles, other plastic plates, make-up preparations, medicaments, flat-rolled iron, imitation jewellery, aluminium structures, egg yolks, synthetic filament, cleaning products and poultry among others. These products have relatively high PCI values ranging from 0.57 to 0.8, depicting high ability for diversity, sophistication and productive know-how required for production. Notwithstanding, this is a low range of PCI in comparison to those of other countries.

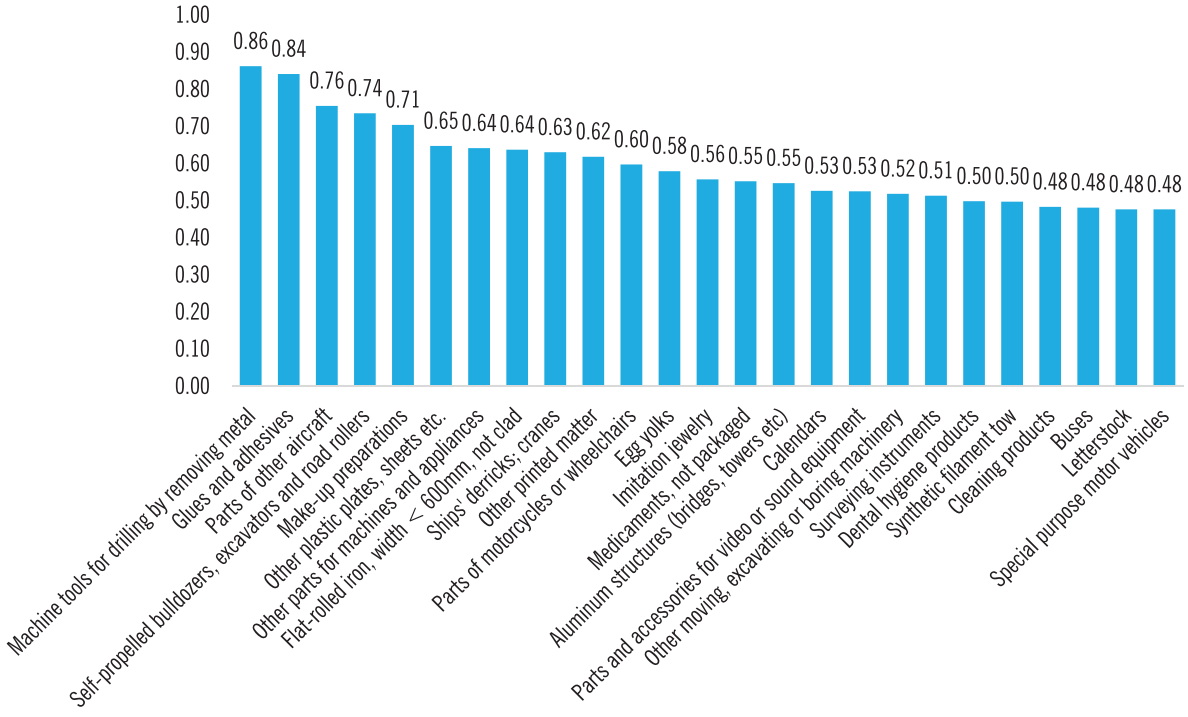
4.3.4 The Opportunity Gain indicator

Figure 7 presents the top 25 products for export diversification based on the Opportunity Gain criterion. Like the PCI case, results for the opportunity gain suggest that Uganda has more export potential to diversify into light manufactured products than agricultural products. These include machine tools for drilling, glues and adhesives, make up preparations, other parts for machines, flat-rolled iron, other printer materials, parts of motorcycles, egg yolks, imitation jewellery, medicaments, aluminium, surveying instruments and cleaning products, among others. The identified products have high opportunity gain values ranging from 0.48 to 0.86, depicting high possibilities for opening future diversification opportunities by developing these products. This implies that these products can open up links to more complex products. The indicator accounts for the complexity of the products not being produced in a location and distance.

4.3.5 The composite indicator

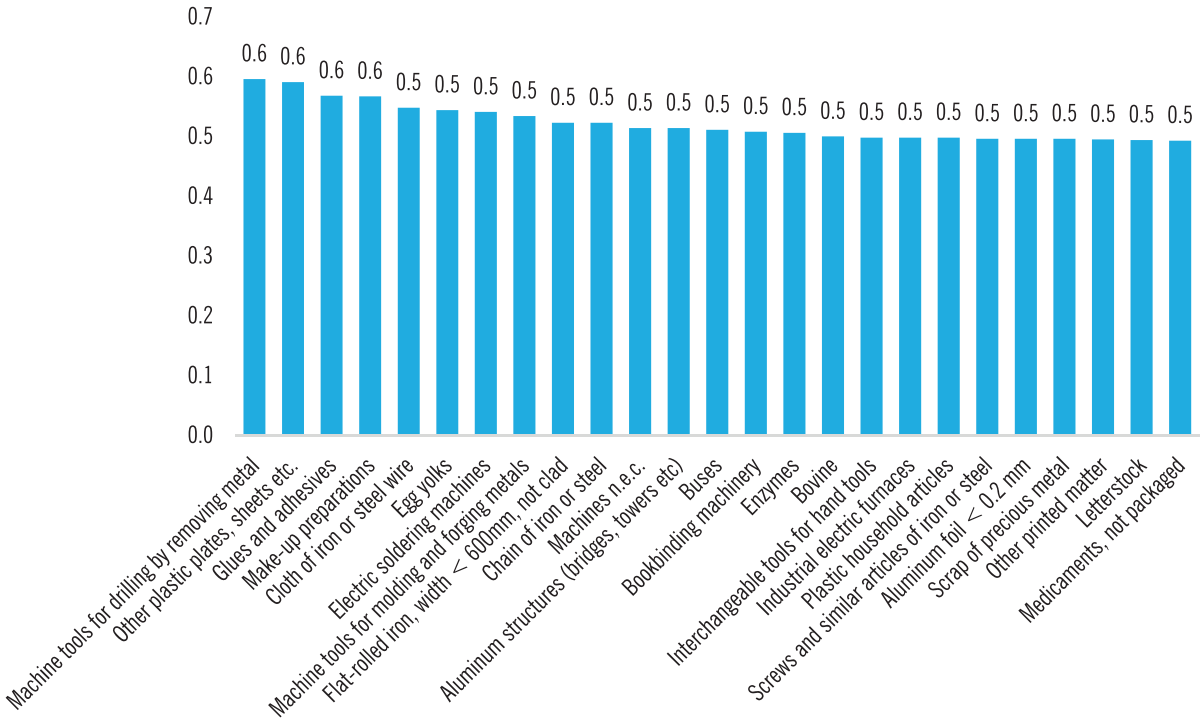
Figure 8 presents the top 25 products for export diversification based on the composite index. Results suggest that Uganda has more potential to diversify into manufactured products than any other sector. These include machine tools for drilling, other plastic plates, glues and adhesives, make-up preparations, cloths

Figure 7 Top 25 products for export diversification according to opportunity gain



Source: International Trade Centre's Export Potential Map (2021)

Figure 8 Top 25 products for export diversification according to opportunity gain composite Index



Source: International Trade Centre's Export Potential Map (2021)

of iron and steel wire, egg yolks, electric soldering machines, machine tools for moulding, flat-rolled iron, chain of iron, machines, aluminium structures, book binding machinery, enzymes, bovine, scrap of precious metal among others.

There is consistency in terms of the products emerging from the first four indicators and the composite indicator. Uganda is more likely to succeed in export diversification in light manufacturing than any other sector. This implies that agro-processing is the plausible route to enhance export diversification in the agricultural sector without limited potential. Uganda has developed its light manufacturing sector with strong market penetration in the DRC, Rwanda, South Sudan and Burundi. However, this is limited by the more competitive light manufactured products from Asia, particularly China and India. This implies that Uganda has to build competitiveness by significantly reducing the costs of production and operation. The other route is to use regional integration to reduce and eliminate high tariff rates with countries that are not part of the EAC and COMESA to increase product competitiveness further. In addition, developing and improving standards will further ensure more enhanced market penetration in especially the EU, Middle East and Asian markets.

4.4 Export product diversification based on the ITC methodology.

Table 6 presents a list of the top 50 products with the potential for diversification in the world market using the ITC methodology. It also presents the total market value in billion US$ for the top products and the top three potential markets with their import tariffs. The results suggest that the top destinations for Uganda's export potential products are Africa, Europe and Asia. The tariffs are largely zero, with a few between 1 and 10 and an extremely small number beyond 11. This implies that tariffs are not a significant hindrance to penetrating the potential export markets after pursuing export diversification. The top products for export diversification are both light manufactured and agro-processed products.

Table 6 Possible products for Uganda's diversification and the accompanying tariff rates (US$ Billions)

Rank	Code	Description	World market	Country1	Tariff	Country2	Tariff	Country3	Tariff
1	080131	Cashew nuts, in shell	3	Viet Nam,	5	India	0	China	0
2	080132	Cashew nuts, shelled	4.6	UAE	5	USA	0	Netherlands	0
3	151110	Crude palm oil	8.7	India	7.5	Kenya	0	Netherlands	0
4	252329	Portland cement	6.2	Rwanda	0	DRC	10	S Sudan	0
5	51620	Vegetable fats, oil & fractions, hydrogen	3.2	Rwanda	0	DRC	10	Burundi	0
6	03XXXX	Molluscs & other aquatic invertebrates	8.7	Hong Kong	0	Spain	0	Italy	0
7	100640	Broken rice	1.8	DRC	10	S Sudan	0	Rwanda	0
8	30120	Flours of fish or crustaceans	4.6	China	0	Viet Nam	0	Germany	0
9	040221	Milk powder	9.1	Sudan	0	Hong Kong	0	UAE	5
10	110100	Wheat or meslin flour	4.8	DRC	10	Sudan	0	Hong Kong	0
11	0907	Cloves	0.42	India	0	Singapore	0	UAE	5
12	740311	Copper cathodes	55.1	UAE	5	China	0	Italy	0
13	0908Xc	Cardamons	0.6696	UAE	0	India	70	Singapore	0
14	21420	Bars & rods of iron or non-alloy steel	11.4	Rwanda	0	UAE	5	Singapore	0
15	482020	Exercise books of paper(-board)	0.542	Rwanda	0	Burundi	0	DRC	5
16	071320	Chickpeas, dried & shelled	1.8	India	0	Pakistan	3	UAE	5
17	150710	Crude soya-bean oil	7.4	India	6.3	Morocco	2.5	Bangladesh	0
18	640220	Footwear, rubber/plastic soles & uppers	2	Rwanda	0	Sudan	0	DRC	20
19	310590	Mineral or chemical fertilisers	1.8	Rwanda	0	Burundi	0	India	0
20	2008XX	Edible parts of plants, prepared or preserv	4.2	Netherlands	0	China	0	Hong Kong	0
21	140490	Vegetable products nes	0.8374	China	0	Poland	0	Somalia	2
22	740200	Unrefined copper	9.8	China	0	India	0	Belgium	0
23	630533	Sacks & bags of polyethylene/	1.8	Kenya	0	Sudan	0	Zambia	0
24	721061	Flat-rolled products of iron or non-alloy ste	2.8	Rwanda	0	DRC	20	S.Sudan	0
25	200949	Pineapple juice, unfermented	0.4153	Netherlands	0	Spain	0	Italy	0
26	080719	Melons, fresh, excl watermelons	1.8	UAE	0	Netherlands	0	Hong Kong	0
27	310520	Mineral or chemical fertilisers	5.9	China	50	Rwanda	0	India	0
28	020450	Goat meat	0.3626	UAE	2.5	USA	0	Hong Kong	0
29	151710	Margarine (excl liquid)	1.5	Rwanda	0	Tanzania	0	Burundi	0
30	760110	Aluminium, not alloyed, unwrought	24.5	Italy	0	Malaysia	0	USA	0

Rank	Code	Description	World market	Country1	Tariff	Country2	Tariff	Country3	Tariff
31	310210	Urea	13.2	Sudan	0	India	0	Burundi	0
32	410441	Grains leather of hides & skins of bovine or	1.1	Hong Kong	0	China	0	India	0
33	85XXXb	Telephone sets & other voice/image trans	423.5	UAE	0	Hong Kong	0	USA	0
34	230610	Oilcake of cotton seeds	0.0931	Kenya	0	India	0	S. Africa	6.6
35	442010	Statuettes & other ornaments, of wood	1	USA	0	Germany	0	Netherlands	0
36	4407Xb	Virola, mahogany, imbuia & balsa, sawn/ c	0.2418	Kenya	0	China	0	India	0
37	4402	Wood charcoal, incl. shell or nut charcoal	1.3	UAE	0	China	0	S. Africa	0
38	720260	Ferro-nickel	5	China	0	India	0	Italy	0
39	230660	Oilcake of palm nuts or kernels	1	Netherlands	0	Pakistan	11	Germany	0
40	151321	Crude palm kernel & babassu oil	1.1	India	0	Netherlands	0	Italy	0
41	230660	Oilcake of palm nuts or kernels	1	Netherlands	0	USA	0	UAE	5
42	170410	Chewing gum	0.9241	Rwanda	0	Tanzania	0	UAE	5
43	180400	Cocoa butter, fat & oil	5.5	Netherlands	0	USA	0	UAE	5
44	170310	Cane molasses from sugar refining	0.5826	Netherlands	0	Italy	0	S. Africa	0
45	1207Xb	Cotton seeds	2.8099	Sudan	0	Italy	0	China	0
46	711319	Jewellery, of precious metal, nes	85.5	UAE	5	Hong Kong	0	Switzerland	0
47	230990	Preparations used in animal feeding	15.4	Kenya	0	Sudan	0	Zambia	0
48	020220	Bovine cuts bone in, frozen	2	S. Sudan	0	Hong Kong	0	Tanzania	0
49	190219	Uncooked pasta	4.2	Hong Kong	0	UAE	10	DRC	20
50	510111	Greasy shorn wool, not carded/combed	3.2	China	38	Italy	0	Czechia	0

Data source: ITC Export Potential Map, exportpotential.intracen.org

We further identify the main products to diversify into for the different regions of the world, namely Africa, the Americas, Asia and Europe: Uganda's best options for export diversification in Africa are wheat or meslin flour, crude palm oil and mineral or chemical fertilizers, urea, flat-rolled products of iron or non-alloy steel, footwear, chewing gum and cashew nuts among others (Figure 9). To the Americas, the products include cashew nuts, pineapple juice, aluminium (not alloyed and unwrought), urea, goat meat, flours of fish, edible parts of plants, cane sugar, among others (Figure 10). Export diversification to Asia is cashew nuts (in shell and shelled), flours of fish or crustaceans, crude palm oil, cloves, cardamons and copper cathodes, among others (Figure 11). Finally, export diversification to Europe will entail products such as; cashew nuts, molluscs and other aquatic invertebrates, crude palm oil, pineapple juice, flours of fish, aluminium, melons, cane molasses and edible parts of plants, among others (Figure 12).

What emerges from the results is that whereas the African market destination mainly underpins export

trade in light manufacturing, and significantly agro-processed products, the Americas, Europe and Asia largely emphases commodities and agro-processed products. This suggests that Uganda should look at the African continent for diversification into manufactured products more than the rest of the continents that import Uganda's commodities for their value addition.

Figure 9 Uganda's top 20 potential products for export diversification in Africa

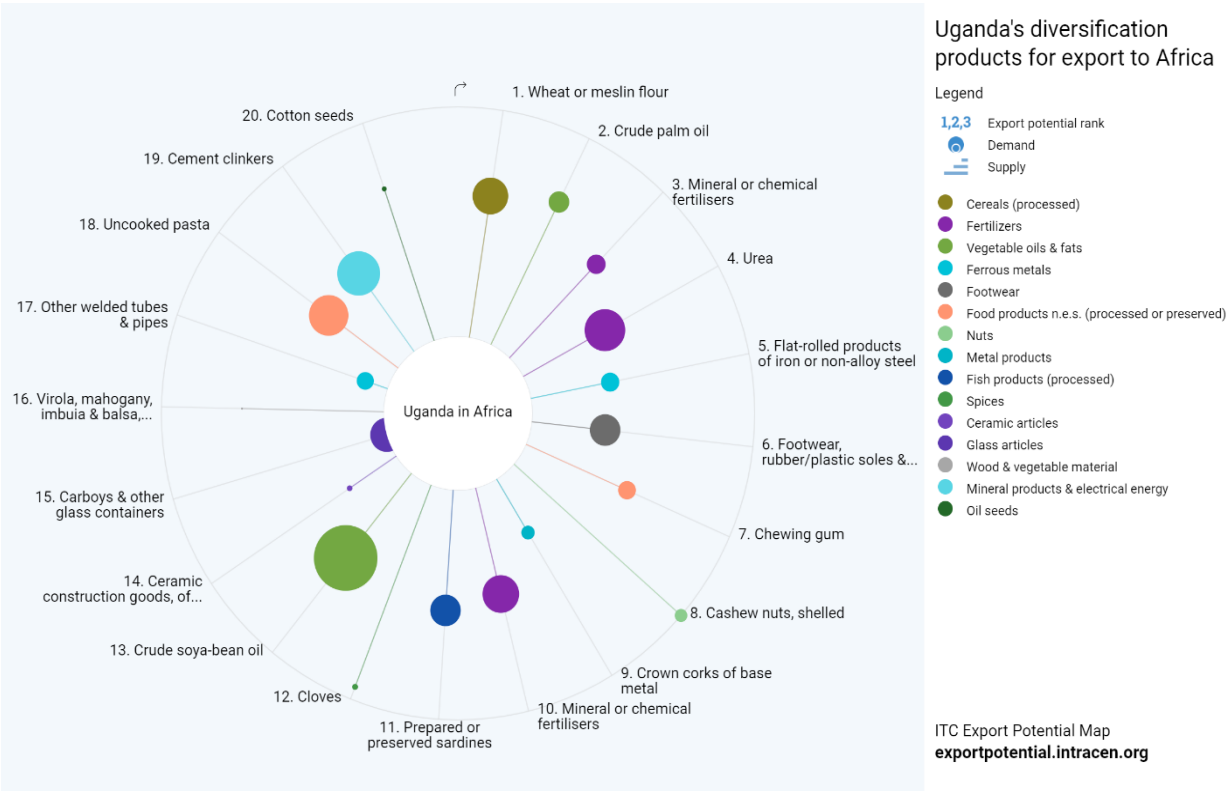


Figure 10 Uganda's top 20 potential products for export diversification in the Americas

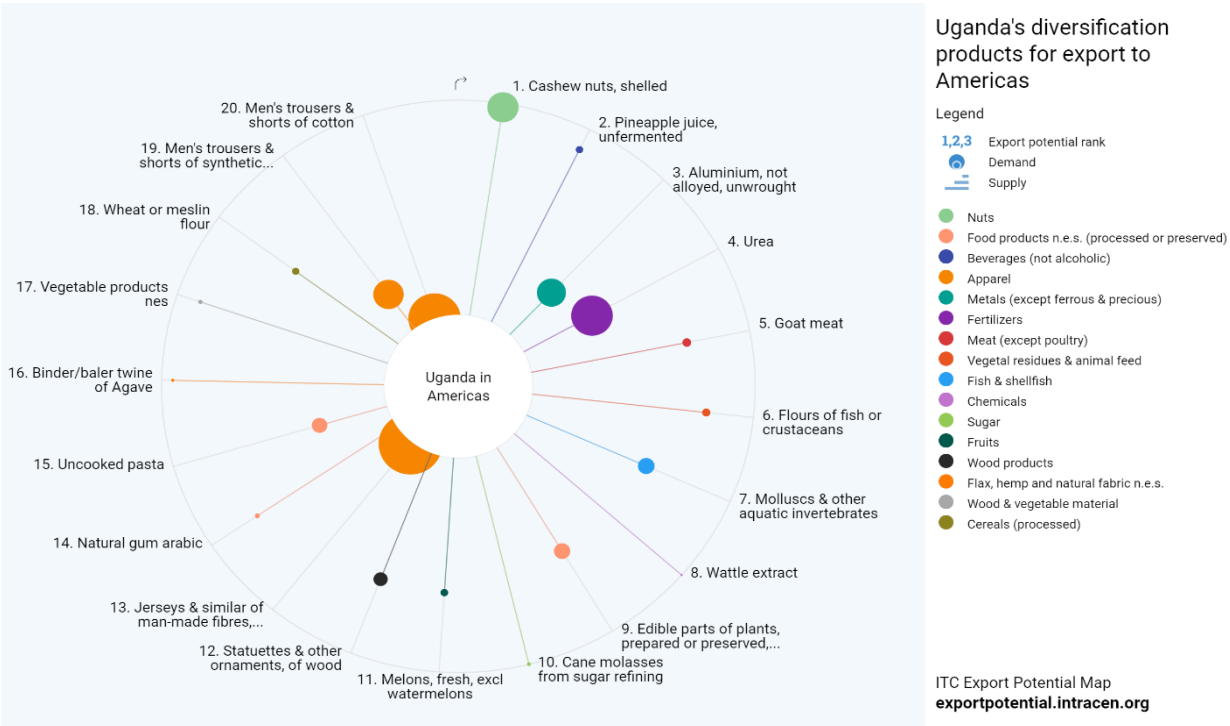


Figure 11 Uganda's top 20 potential products for export diversification to Asia

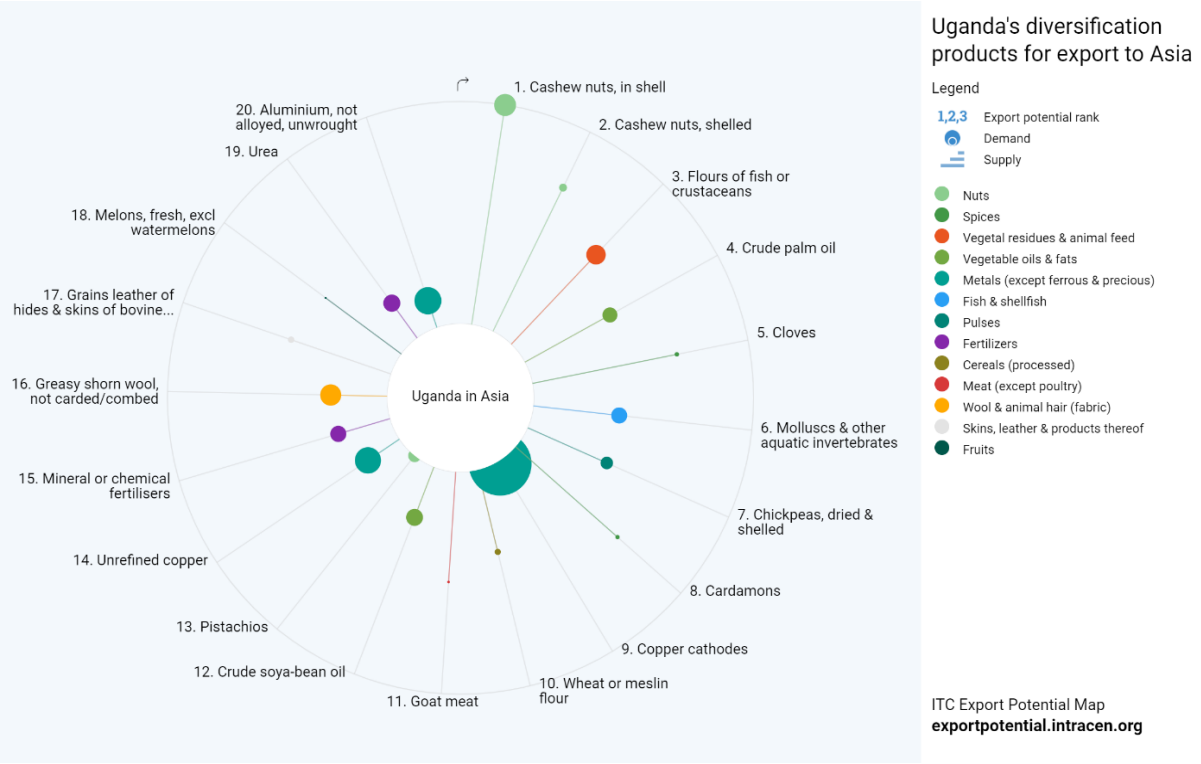
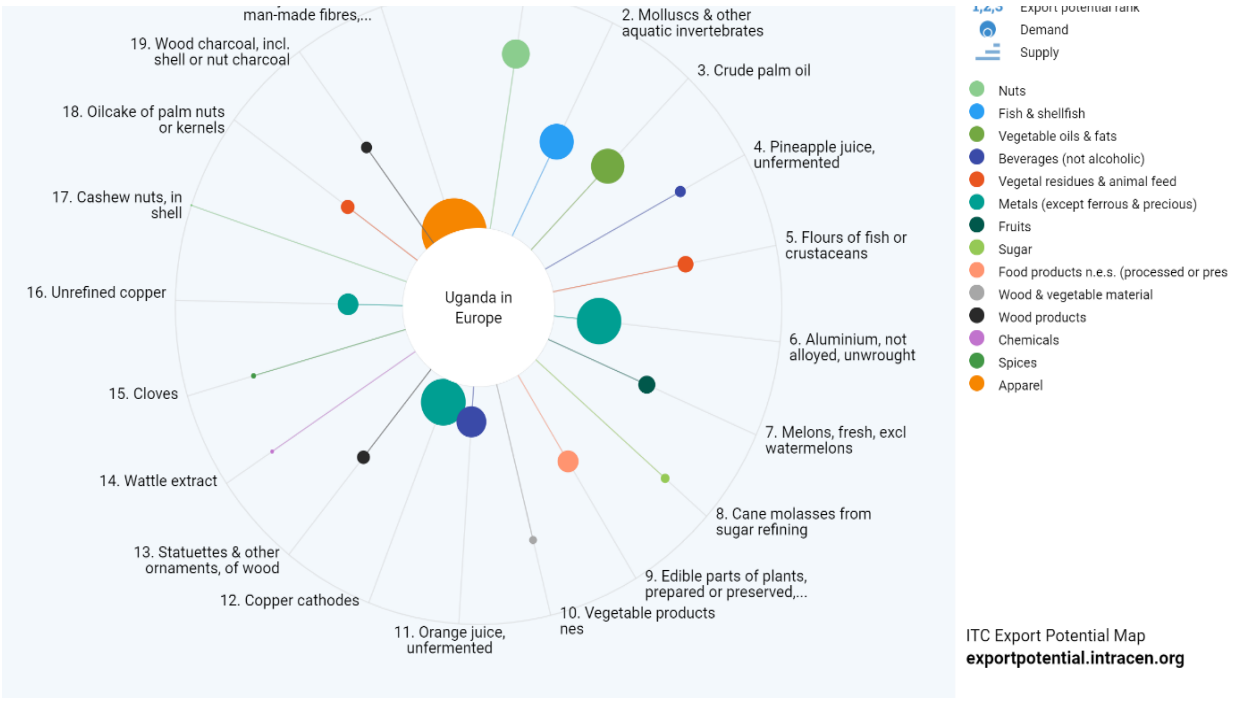


Figure 12 Uganda's top 20 potential products for export diversification to Europe



5 CONCLUSION AND POLICY IMPLICATIONS

The study identifies the sectors and products for export intensification and diversification. It thus provides the potential sectors and products that Uganda can leverage in developing its National Export Development Strategy. Uganda has a comparative advantage intensifying and diversifying its exports in the agricultural, minerals, light manufacturing and textile sectors. In addition, Uganda is exploiting only 62 percent of its potential export market, suggesting that there is a 38 percent unutilized export market that needs to be tapped into. Whereas the African market destination mainly constitutes export trade in light manufacturing and significantly agro-processed products, the Americas, Europe and Asia essentially include commodities and agro-processed products. Therefore, we conclude that Uganda depends more on the African continent for manufactured products export than the rest of the continents that import Uganda's commodities for value addition.

There is consistency in terms of the products that are emerged from the four indicators and the composite indicator. Uganda is more likely to succeed in export diversification in light manufacturing than any other sectors, implying that agro-processing is the plausible route to enhance export diversification in the agricultural sector. The potential is limited. However, light manufacturing is under threat from the more competitive products from Asia, particularly China and India. The following policy implications emerge from the study:

1. There is a need to enhance the competitiveness of Uganda's export products that are predominantly agricultural, mineral, light manufacturing and textile products, which have a high potential for export intensification and diversification. In light of this, Uganda should:

i. Build competitiveness by significantly reducing the costs of production and operation. This can be achieved by undertaking initiatives such as improving the infrastructure (energy, transport and e-commerce) and addressing institutional inefficiencies (bureaucracy and corruption) to reduce trading costs.
ii. Leverage regional integration to reduce and eliminate high tariff rates with countries that are not part of the EAC and COMESA to increase product competitiveness.
iii. Endeavour to develop and improve its product standards to ensure more enhanced market penetration in especially the EU, Middle East and Asian markets.

2. Both private and public sectors should address supply-side constraints that impede and limit the production capacities of Uganda's enterprises to tap into the available export opportunities. These include capacities to produce, market and export products.

3. Relevant government agencies should provide adequate an d timely information to enable exporters to take advantage of the available export diversification and intensification opportunities. The role of the Uganda Export Promotion Board, the AGO unit and Commercial Attaches in foreign missions, among others, is critical

4. Tapping into export markets requires strengthening the existing export promotion institutional framework including actors such as the Ministry of Trade, Industry and Cooperatives, National Planning Authority, the Uganda Export Promotion Board and Uganda Investment Authority to ensure that key stakeholders are well aligned and coordinated to provide strategic guidance to both domestic and foreign investors.

5. Uganda should look at the African continent for diversification into manufactured products more than the rest of the continents that import Uganda's commodities for value addition.

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Table A1 Uganda potential exports (Atlas) – Agriculture Description

Code	Description	Uganda Export US$ mn	World Trade US$ mn	Uganda Share	RCA	Destinations
0901	Coffee, whether or not roasted or decaffeinated; coffee husks and skins; coffee substitutes	432	**28,900**	0.015	0.98	Italy Germany Sudan Belgium USA Spain
0713	Dried leguminous vegetables, shelled, whether or not skinned or split	93.4	**8,650**	0.011	0.97	Kenya Sudan Pakistan UAE Vietnam Burundi Rwanda
1005	Maize and Corn	89.1	**32,700**	0.003	0.9	Kenya Sudan Rwanda Burundi CAR DRC
1701	Sugars and sugar confectionery	75.9	**22,400**	0.003	0.92	Sudan Kenya DRC Rwanda Switzerland S.A CAR
0304	Fish fillets and other fish meat, whether or not minced, fresh, chilled or frozen	72.8	**24,100**	0.003	0.92	Netherlands Belgium UAE Israel Italy Portugal Spain
2401	Unmanufactured tobacco; tobacco refuse	68.9	**10,700**	0.006	0.96	Kenya Tanzania Burundi DRC Angola Egypt
0305	Fish, fit for human consumption, dried, salted or in brine; smoked fish, fit for human	67.3	**6,390**	0.011	0.98	HK Vietnam Rwanda Burundi Kenya UAE
0401	Milk and cream, not concentrated nor containing added sugar or other sweetening matter	65.4	**9,320**	0.007	0.96	EAC DRC Somali and Sudan
1007	Grain sorghum	60.9	**1,180**	0.052	0.99	Sudan South .Sudan Kenya DRC Rwanda Somalia Belgium Burundi
1801	Cocoa beans, whole or broken, raw or roasted	51.7	**8,250**	0.006	0.96	Indonesia Malaysia India Netherlands Belgium Italy
1511	Palm oil and its fractions, whether or not refined (excluding chemically modified)	48.9	**29,200**	0.002	0.84	Sudan DRC Rwanda Tanzania Burundi CAC
0602	Live plants incl. their roots, cuttings and slips; mushroom spawn (excluding bulbs, tubers, ...	42.8	**9,170**	0.005	0.94	Netherlands USA Germany Japan S. Africa Norway UK
0902	Tea, whether or not flavored	36.1	**7,120**	0.005	0.95	Kenya Sudan DRC Rwanda Chad Iran
2309	Preparations of a kind used in animal feeding	30.7	**29,600**	0.001	0.76	Kenya Rwanda DRC Sudan Somalia S Sudan Burundi
1207	Other oil seeds and oleaginous fruits, whether or not broken (excluding edible nuts, olives,	27.2	**4,640**	0.006	0.96	China Turkey Netherlands Germany Kenya Spain
1006	Rice	26.9	**24,200**	0.001	0.78	DRC Sudan Rwanda CAR Somalia S Sudan
4411	Fiberboard of wood or other ligneous materials, whether or not agglomerated with resins or .	25.7	**10,600**	0.002	0.89	EAC Sudan DRC Thailand
2302	Bran, sharps and other residues, whether or not in the form of pellets, derived from the sif	24.7	**2,060**	0.012	0.98	

Code	Description	Uganda Export US$ mn	World Trade US$ mn	Uganda Share	RCA	Destinations
0402	Milk and cream, concentrated or containing added sugar or other sweetening matter	23.6	**18,600**	0.001	0.81	EAC DRC Japan Malawi Sudan
0603	Cut flowers and flower buds of a kind suitable for bouquets or for ornamental purposes, fr	18.8	**8,270**	0.002	0.88	Netherlands Rwanda DRC Belgium Congo Denmark

Data source: Authors' computation using Atlas of Economic Complexity

Table A2 Uganda potential exports (Atlas) – Chemicals

Code	Description	Uganda Export US$ mn	World Trade US$ mn	Uganda Share	RCA	Destinations
3401	Soap; organic surface-active products and preparations for use as soap, in the form of bars,	27.8	**6,790**	0.004	0.93	EAC DRC Somali Sudan Netherlands
3923	Articles for the conveyance or packaging of goods, of plastics; stoppers, lids, caps and other	9.5	**53,700**	0.0002	0.13	Rwanda Burundi Tanzania Sudan DRC Kenya Germany
3917	Tubes, pipes and hoses, and fittings therefor, e.g. joints, elbows, flanges, of plastics	5.2	**25,900**	0.0002	0.18	DRC Rwanda Sudan Burundi Singapore Kenya Tanzania
3305	Dextrins and other modified starches, e.g. pregelatinised or esterified starches; glues based ...	4.56	**14,100**	0.0003	0.4	Burundi Rwanda DRC S.Sudan Congo Kenya Sudan
3208	Paints and varnishes, incl. enamels and lacquers, based on synthetic polymers or chemically	4.1	**14,600**	0.0003	0.34	Rwanda Sudan DRC Burundi Somali S.Sudan
3301	Essential oils, whether or not terpeneless, incl. concretes and absolutes; resinoids; extracted	2.32	**5,910**	0.0004	0.48	India France Spain DRC Canada Rwanda
2815	Sodium hydroxide "caustic soda", potassium hydroxide "caustic potash"; peroxides of	1.94	**7,570**	0.0003	0.32	DRC Rwanda Sudan Somali S.Sudan Burundi
3501	Casein, caseinates and other casein derivatives; casein glues (excluding those packaged as ..	1.9	**1,780**	0.001	0.77	USA India Ethiopia Belgium Burundi Japan Sudan UK
2929	Compounds with other nitrogen function (excluding amine-function compounds; oxygen-	1.75	**7,450**	0.0002	0.25	DRC Kenya Rwanda Burundi Sudan Tanzania S.Sudan
2804	Hydrogen, rare gases and other non-metals	1.62	**11,100**	0.0001	0.05	DRC France Rwanda Sudan Turkey S.Sudan Burundi
4013	Inner tubes, of rubber	1.42	**1,090**	0.001	0.81	EAC DRC Sudan Congo
3209	Tanning or dyeing extracts; tannins and their derivatives; dyes, pigments and other colouring	0.968	**6,500**	0.0001	0.03	Rwanda Sudan DRC Burundi Kenya Zambia France

Code	Description	Uganda Export US$ mn	World Trade US$ mn	Uganda Share	RCA	Destinations
3915	Waste, parings and scrap, of plastics	0.872	**3,380**	0.0003	0.31	India China Spain S.Africa Kenya DRC S.Sudan
3603	Safety fuses; detonating fuses; percussion or detonating caps; igniters; electric detonators ...	0.624	**1,650**	0.0004	0.46	Rwanda Sudan DRC Somalia S.Sudan Burundi
3814	Organic composite solvents and thinners, n.e.s.; prepared paint or varnish removers	0.519	**1,810**	0.0003	0.35	DRC Rwanda Burundi S.Sudan South Africa Sudan Kenya

Data source: Authors' computation using Atlas of Economic Complexity

Table A3 Uganda potential exports (Atlas) – Metals

Code	Description	Uganda Export US$ mn	World Trade US$ mn	Uganda Share	RCA	Destinations
7210	Flat-rolled products of iron or non-alloy steel, of a width >= 600 mm, hot-rolled or cold-rolle	47.2	**52,300**	0.001	0.74	EAC Malawi Sudan CAR DRC
7306	Tubes, pipes and hollow profiles "e.g., open seam or welded, riveted or similarly closed",	19.3	**24,800**	0.001	0.7	DRC Sudan Rwanda Burundi Malawi Kenya S.Sudan
7214	Bars and rods, of iron or non-alloy steel, not further worked than forged, hot-rolled, hot-	18.1	**17,200**	0.001	0.77	EAC DRC CAR
7217	Wire of iron or non-alloy steel, in coils (excluding bars and rods)	6.22	**7,600**	0.001	0.71	EAC DRC Sudan Congo
7317	Nails, tacks, drawing pins, corrugated nails, staples and similar articles of iron or steel,	6.19	**2,980**	0.002	0.88	DRC Rwanda Sudan Burundi Burundi Kenya Somalia
7216	Angles, shapes and sections of iron or non-alloy steel, n.e.s.	3.62	**14,300**	0.0003	0.33	Rwanda Kenya Sudan Tanzania DRC Burundi
7206	Iron and non-alloy steel in ingots or other primary forms (excluding remelting scrap ingots, ..	2.66	**580**	0.005	0.94	DRC Sudan Malawi Burundi S.Sudan CAR
7303	Tubes, pipes and hollow profiles, of cast iron	1.06	**1,550**	0.001	0.66	Rwanda Somalia DRC Burundi S.Sudan
7301	Sheet piling of iron or steel, whether or not drilled, punched or made from assembled	0.584	**2,140**	0.0003	0.42	Rwanda DRC Sudan CAR S.Sudan Burundi Congo
8201	Hand tools, the following: spades, shovels, mattocks, picks, hoes, forks and rakes, of base ..	0.352	**1,670**	0.0002	0.23	Sudan DRC Kenya Rwanda Somalia S.Sudan Burundi

Data source: Authors' computation using Atlas of Economic Complexity

Table A4 Uganda potential exports (Atlas) – Minerals

Code	Description	Uganda Export US$ mn	World Trade US$ mn	Uganda Share	RCA	Destinations
2712	Petroleum jelly, paraffin wax, micro-crystalline petroleum wax, slack wax, ozokerite, lignite	639	**3,300**	0.1936	0.17	Kenya DRC Sudan Burundi Rwanda S.Sudan Congo
2523	Cement, incl. cement clinkers, whether or not coloured	56.5	**11,900**	0.005	0.94	DRC Rwanda Sudan CAR Burundi S.Sudan
2716	Electrical energy	33	**37,400**	0.001	0.73	Kenya Tanzania Rwanda DRC S.Sudan
2615	Niobium, tantalum, vanadium or zirconium ores and concentrates	2.16	**1,880**	0.001	0.79	DRC China Kenya India S Africa Thailand UAE
2530	Vermiculite, perlite and other mineral substances, n.e.s.	1.97	**2,660**	0.001	0.68	Spain USA UK Australia Japan S.Africa
2501	Salts, incl. table salt and denatured salt, and pure sodium chloride, whether or not in aqueous	1.7	**3,360**	0.001	0.57	Sudan Rwanda Burundi DRC CAR Somalia S.Sudan
2620	Slag, ash and residues containing metals, arsenic or their compounds (excluding those from .	1.31	**8,160**	0.0002	0.08	Kenya UAE Pakistan DRC S.Sudan

Data source: Authors' computation using Atlas of Economic Complexity

Table A5 Uganda potential exports (Atlas) – Stones

Code	Description	Uganda Export US$ mn	World Trade US$ mn	Uganda Share	RCA	Destinations
7108	Gold, incl. gold plated with platinum, unwrought or not further worked than semi-	905	**287,000**	0.003	0.89	UAE Belgium HK India UK Vietnam S. Africa
6908	Glazed ceramic flags and paving, hearth or wall tiles; glazed ceramic mosaic cubes and the ..	2.48	**1,160**	0.002	0.88	Kenya Sudan DRC S. Sudan Austria Burundi
7115	Articles of precious metal or of metal clad with precious metal, n.e.s.	0.552	**3,760**	0.0001	0.03	DRC Belize Canada Zimbabwe Sudan Thailand Tanzania

Data source: Authors' computation using Atlas of Economic Complexity

Table A6 Uganda potential exports (Atlas) – Textiles

Code	Description	Uganda Export US$ mn	World Trade US$ mn	Uganda Share	RCA	Destinations
5201	Cotton, neither carded nor combed	23.9	**14,100**	0.002	0.85	Portugal Bangladesh Singapore Indonesia Switzerland Kenya,
6704	Wigs, false beards, eyebrows and eyelashes, switches and the like, of human or animal hair .	5.44	**3,580**	0.002	0.78	Kenya DRC Rwanda Sudan Burundi
6305	Sacks and bags, of a kind used for the packing of goods, of all types of textile materials	4.54	**5,190**	0.001	0.73	Sudan DRC Rwanda Burundi Mozambique Tanzania Kenya Thail
9404	Mattress supports (excluding spring interiors for seats); articles of bedding and similar fur	4.32	**17,000**	0.0003	0.29	DRC Sudan Rwanda Ghana UAE Kenya
5210	Woven fabrics of cotton, containing predominantly, but < 85% cotton by weight,	2.12	**1,970**	0.001	0.77	DRC Rwanda Sudan Burundi Congo Kenya
9406	Prefabricated buildings, whether or not complete or already assembled	1.99	**8,390**	0.0002	0.26	Sudan Kenya Malawi Tanzania Somalia S.Sudan
6306	tarpaulins, awnings and sunblinds; tents; sails for boats, sailboards or landcraft; camping	1.81	**4,400**	0.0004	0.5	DRC Rwanda Sudan Burundi Ethiopia Nigeria Kenya
5502	Artificial filament tow as specified in Note 1 to chapter 55	1.46	**1,950**	0.001	0.68	DRC Sudan S.Sudan Congo Kenya S.Africa Tanzania
6309	Worn clothing and clothing accessories, blankets and travelling rugs, household linen	0.999	**4,120**	0.0002	0.27	Sudan DRC Rwanda USA S Africa Kenya France
5607	Twine, cordage, ropes and cables, whether or not plaited or braided and whether or not	0.933	**2,450**	0.0004	0.47	DRC Sudan Kenya Rwanda S.Sudan Australia Burundi
6301	Blankets and travelling rugs of all types of textile materials (excluding table covers,	0.895	**4,470**	0.0002	0.04	Kenya Ethiopia Burundi DRC Sudan Rwanda Somalia S.Sudan
5512	Woven fabrics containing >= 85% synthetic staple fibres by weight	0.668	**3,040**	0.0002	0.24	DRC Rwanda S.Sudan Burundi Gambia Japan Kenya
5513	Woven fabrics containing predominantly, but < 85% synthetic staple fibres by weight, mixed	0.49	**2,620**	0.0002	0.16	Rwanda DRC Burundi Angola China Congo

Data source: Authors' computation using Atlas of Economic Complexity

Table A7 Potential for Uganda's products US$ millions (ITC)

HSIC Code	Product	Export potential (Millions $)	Actual exports (Millions $)	Untapped potential remaining in (Millions $)	Performance
090111	Coffee, not roasted, not decaffeinated	672.7	492.3	219.5	73.2
0305Xb	Fish nes, cured	139.4	57.6	81.8	41.3
170199	Cane or beet sugar & chemically pure sucrose	126.3	59.7	78.9	47.3
180100	Cocoa beans	125.0	69.6	68.6	55.7
040120	Milk	122.1	64.8	57.4	53.1
0713Xa	Beans "Vigna & Phaseolus" nes, dried & shelled	115.8	34.9	81.0	30.1
1701XX	Raw cane sugar	71.5	29.5	49.5	41.3
090240	Black tea, packings >3kg	68.2	29.5	47.0	43.3
151190	Palm oil (excl crude) & fractions	52.7	37.9	28.1	71.9
120740	Sesamum seeds	45.6	30.6	23.7	67.1
0304Xa	Fish cuts, fresh	44.3	55.0	23.2	124.2
040210	Low-fat milk powder	43.3	17.3	26.0	40.0
0304Xb	Fish fillets, frozen	39.6	31.5	22.9	79.5
520100	Cotton, not carded/combed	32.1	25.8	16.5	80.4
060210	Unrooted cuttings & slips	31.9	33.8	8.8	106.0
230230	Bran, sharps & other residues of wheat	30.9	16.1	18.4	52.1
151211	Crude sunflower-seed or safflower oil	30.3	6.8	30.0	22.4
410411	Grains of hides & skins of bovine or equine animals	30.2	17.1	16.3	56.6
721041	Flat-rolled products of iron or non-alloy steel	27.4	24.1	11.6	88.0
340119	Soap & organic surface-active products	26.2	16.4	12.0	62.6
0905	Vanilla	26.0	20.3	11.0	78.1
071333	Kidney beans "Phaseolus vulgaris", dried & shelled	19.8	12.0	14.9	60.6
4412	Plywood, veneered panel & similar laminated wood	19.4	15.4	12.1	79.4
410621	Hides & skins of goats or kids, in the wet state	19.2	8.6	11.7	44.8
3004Xb	Medicaments consisting of mixed or unmixed products, retail	17.2	17.2	14.9	100.0
4411	Fibreboard of wood/other ligneous materials	16.7	10.9	11.9	65.3
1008Xa	Millet (excl grain sorghum)	16.6	6.0	10.6	36.1
0713Xb	Legumes nes, dried & shelled	16.0	6.0	13.0	37.5
0302Xd	Fish nes, whole, fresh	15.5	11.7	13.9	75.5
110220	Maize flour	15.4	15.1	7.0	98.1
040229	Sweetened milk powder	15.3	8.1	7.2	52.9
220300	Beer made from malt	13.7	10.7	10.2	78.1
190531	Sweet biscuits	12.4	9.6	6.9	77.4
330499	Beauty, make-up & skincare preparations	12.0	6.6	8.3	55.0

HSIC Code	Product	Export potential (Millions $)	Actual exports (Millions $)	Untapped potential remaining in (Millions $)	Performance
710813	Gold, semi-manufactured, for non-monetary purposes	10.7	65.3	5.3	610.3
0303Xa	Fish nes, whole, frozen	10.6	4.9	9.6	46.2
230400	Oilcake of soya-bean oil	10.5	7.9	8.9	75.2
0803	Bananas, fresh or dried	7.3	4.3	5.3	58.9
4403Xc	Wood in the rough, nes	7.3	4.6	4.9	63.0
410419	Hides and skins of bovine or equine animals, nes	7.0	2.7	5.2	38.6
520300	Cotton, carded/combed	6.9	10.1	3.2	146.4
1207Xa	Oil seeds & oleaginous fruits nes	6.1	4.2	4.2	68.9
020714	Fowls, cuts & offal, frozen	6.1	0.1	6.1	1.4
410510	Skins of sheep or lambs, in the wet state	6.1	3.4	4.4	55.7
6907	Unglazed ceramic flags, paving, hearth, wall tiles, mosaic	6.0	4.7	5.3	78.3
860900	Cargo containers	6.0	11.4	4.1	190.0
481910	Cartons, boxes & cases, of corrugated paper(-board)	6.0	5.2	2.1	86.7
1201	Soya beans	5.9	5.2	4.1	88.1
330590	Preparations for use on the hair, nes	5.6	3.1	3.9	55.4
721720	Iron/steel wire, in coils, plated/coated with zinc	5.3	4.3	4.3	81.1
080440	Avocados, fresh or dried	5.3	3.5	4.0	66.0
392330	Bottles & articles for conveying/packaging of goods, of plastics	5.3	4.3	3.2	81.1
9406	Prefabricated buildings	5.1	6.0	3.0	117.6
151219	Sunflower-seed or safflower oil (excl crude) & fractions	5.1	3.4	2.6	66.7
071331	Beans "Vigna mungo or Vigna radiata", dried & shelled	5.0	3.3	3.2	66.0
1008Xb	Cereals nes	4.9	2.1	2.9	42.9
040590	Dairy fats & oils	4.8	3.7	3.4	77.1
482110	Paper(-board) labels, printed	4.7	4.2	3.4	89.4
110290	Cereal nes flours	4.6	6.2	2.7	134.8
670490	False beards, eyebrows & -lashes, nes	4.6	3.5	3.2	76.1
070190	Potatoes, fresh	4.4	4.7	1.6	106.8
350110	Casein	4.3	4.3	3.5	100.0
731700	Nails of iron or steel	4.2	3.6	2.2	85.7
320890	Paints & varnishes based, incl. enamels and lacquers, on s	3.9	4.8	1.6	123.1
1202	Groundnuts, excl roasted or cooked	3.9	2.5	2.9	64.1
100630	Semi-milled or wholly milled rice	3.9	5.7	2.2	146.2
071410	Roots & tubers of manioc	3.6	2.8	0.9	77.8
090112	Coffee, not roasted, decaffeinated	3.5	3.6	2.1	102.9
080510	Oranges, fresh or dried	3.3	2.3	3.1	69.7

HSIC Code	Product	Export potential (Millions $)	Actual exports (Millions $)	Untapped potential remaining in (Millions $)	Performance
020712	Fowls, whole, frozen	3.2	1.0	2.9	31.3
220890	Ethyl alcohol of an alcoholic strength of <80% vol	3.1	2.7	1.7	87.1
610910	T-shirts & vests of cotton, knit/crochet	2.8	2.2	2.2	78.6
080430	Pineapples, fresh or dried	2.7	1.2	1.8	44.4
070960	Peppers (Capsicum or Pimenta), fresh	2.7	4.6	2.0	170.4
330129	Essential oils	2.6	2.0	2.0	76.9
2202XX	Non-alcoholic beverages	2.6	3.2	1.3	123.1
70200	Tomatoes, fresh	2.6	2.0	1.6	76.9
330520	Preparations for permanent waving/ straightening	2.5	1.3	1.8	52.0
401140	Rubber pneumatic tyres for motorcycles, new	2.4	2.3	1.7	95.8
0709XX	Vegetables, fresh or chilled	2.4	2.0	1.9	83.3
100590	Maize (excl seed for sowing)	2.3	3.2	1.7	139.1
0304Xc	Fish meat, frozen	2.3	2.3	1.8	100.0
360500	Matches	2.3	1.2	1.4	52.2
271210	Petroleum jelly	2.2	0.5	2.0	22.4
360200	Prepared explosives	2.1	1.3	1.2	61.9
080450	Guavas, mangoes & mangosteens, fresh or dried	2.1	1.0	1.7	47.6
271600	Electrical energy	2.1	0.5	1.8	23.3
970110	Paintings	2.1	0.8	1.8	37.6
392350	Stoppers, caps & other closures, of plastics	2.1	1.9	1.6	90.5
4407Xa	Coniferous wood sawn/chipped lengthwise, sliced/peeled	2.1	1.4	1.4	66.7
220210	Waters as beverage	2.0	4.0	1.3	200.0
230630	Oilcake of sunflower seeds	1.9	1.1	0.9	57.9
071420	Sweet potatoes	1.7	1.7	1.2	100.0
3907Xa	Poly"ethylene terephthalate", in primary forms	1.6	1.4	1.4	87.5
0714XX	Roots & tubers nes, sago pith	1.6	1.2	1.1	75.0
220710	Undenatured ethyl alcohol	1.5	1.3	1.2	86.7
1211XX	Medicinal plants, herbs, etc., nes	1.5	1.3	1.1	86.7
070820	Beans "Vigna spp., Phaseolus spp.", fresh	1.5	1.8	0.8	120.0
4407Xc	Wood, sawn/chipped lengthwise, sliced/ peeled, thickness >6mm	1.5	1.2	1.2	80.0
210390	Preparations for sauces & prepared sauces	1.4	1.6	0.9	114.3
721790	Iron/steel wire, in coils, plated/coated, nes	1.4	1.1	0.6	78.6
210690	Food preparations	1.4	2.2	1.0	157.1
090411	Pepper (Piper), not crushed, not ground	1.4	0.8	1.2	58.7
0810XX	Fruits nes, fresh	1.3	1.1	1.0	84.6
220720	Denatured ethyl alcohol & other spirits	1.2	1.6	0.7	133.3
150790	Soya-bean oil (excl crude) & fractions	1.1	0.8	0.9	72.0

HSIC Code	Product	Export potential (Millions $)	Actual exports (Millions $)	Untapped potential remaining in (Millions $)	Performance
090230	Black tea, packings <=3kg	1.1	2.8	0.9	254.5
071340	Lentils, dried & shelled	1.0	0.5	0.9	48.9
480300	Paper for household/sanitary purposes, cellulose wadding/we	1.0	1.0	0.7	100.0
0904XX	Pepper (Capsicum or Pimenta), dried, crushed or ground	0.9	1.5	0.6	159.2
48XXXa	Newsprint & uncoated paper(-board)	0.9	1.4	0.7	149.0
401390	Inner tubes, of rubber, nes	0.9	1.0	0.5	106.8
130190	Lac; natural gums (excl gum arabic), resins, balsams, etc.	0.9	0.5	0.9	54.2
420221	Handbags, outer surface of (composition/ patent) leather	0.9	0.3	0.9	37.2
360300	Safety/detonating fuses; percussion/ detonating caps; igniters;	0.9	0.7	0.4	78.2
880310	Aircraft propellers	0.9	0.9	0.8	101.9
0407	Birds' eggs in shell	0.9	0.6	0.8	67.2
151590	Fixed vegetable fats, oil & fractions	0.9	0.5	0.7	64.0
630190	Blankets & travelling rugs, nes	0.8	0.5	0.7	60.6
6402XX	Other footwear, rubber/plastic soles & uppers	0.8	1.2	0.7	143.1
040510	Butter	0.8	0.8	0.7	98.1
220850	Gin & Geneva	0.8	1.0	0.5	118.2
070930	Aubergines, fresh	0.8	1.4	0.6	173.8
392062	Non-cellular polyethylene terephthalate, in flat shapes	0.8	0.8	0.7	95.4
391729	Rigid tubes of plastics, nes	0.8	0.7	0.5	85.2
340111	Soap & organic surface-active products, for toilet use	0.8	0.6	0.5	78.8
392490	Household/toilet articles, of plastics, nes	0.8	0.8	0.4	109.3
4101XX	Whole raw hides, split raw hides & skins of bovine or equine	0.8	0.5	0.7	63.4
4410XX	Particle board & similar board of wood	0.7	1.1	0.6	149.4
392310	Boxes & articles for conveying/packaging goods, of plastics	0.7	0.7	0.6	98.9
760421	Hollow profiles of aluminium alloys, nes	0.7	0.8	0.3	110.7
071090	Mixtures of vegetables, frozen	0.7	2.4	0.4	349.8
392410	Table/kitchenware, of plastics	0.7	0.5	0.5	73.6
961900	Sanitary articles	0.7	0.8	0.5	112.9
2009XX	Juice of fruit or vegetables, unfermented	0.7	0.7	0.5	109.3
0102	Live bovine animals	0.6	0.9	0.5	141.7
340290	Surface-active & washing preparations	0.6	0.7	0.3	105.0
482190	Paper(-board) labels, non-printed	0.6	0.8	0.3	126.9
940370	Plastic furniture	0.6	0.6	0.4	100.9

HSIC Code	Product	Export potential (Millions $)	Actual exports (Millions $)	Untapped potential remaining in (Millions $)	Performance
392510	Reservoirs, tanks & similar containers, of plastics, >=300L	0.6	0.6	0.3	91.9
050790	Tortoiseshell, whalebone, horns, etc.	0.6	0.2	0.5	30.9
200600	Edible parts of plants preserved by sugar	0.6	0.7	0.5	105.6
080711	Watermelons, fresh	0.6	0.3	0.4	48.4
382319	Fatty acids, industrial, monocarboxylic; acid oils from refining	0.6	0.4	0.5	65.5
170490	Sugar confectionery not containing cocoa	0.6	0.6	0.3	110.0
080550	Lemons & limes, fresh or dried	0.6	0.2	0.5	41.3
091099	Spices nes	0.5	0.4	0.3	89.2
0802Xc	Nuts nes	0.5	0.2	0.4	37.4
0910XX	Ginger	0.5	0.4	0.4	74.8
391739	Flexible tubes of plastics, combined with other materials	0.5	0.4	0.3	89.9
730110	Sheet piling, of iron/steel	0.5	0.5	0.3	104.6
392690	Articles of plastics & other materials of HS39, nes	0.4	0.8	0.4	195.0
761010	Door/window (frames), of aluminium	0.4	0.7	0.2	164.6
070810	Peas "Pisum sativum", fresh	0.4	0.2	0.4	45.4
3808	Insecticides, rodenticides, fungicides, herbicides & similar	0.4	0.6	0.3	152.5
3002XX	Human & animal blood, blood fractions & immunological prod	0.4	0.8	0.3	206.1
711790	Imitation jewellery, nes	0.4	0.2	0.3	64.2
48XXXb	Paper(-board) & articles thereof, nes	0.4	0.4	0.2	126.1
040299	Concentrated sweetened milk & cream	0.3	0.3	0.2	99.9
610990	T-shirts & vests, knit/crochet, nes	0.3	0.3	0.3	88.5
4602XX	Basketwork, wickerwork & other articles from vegetable	0.3	0.5	0.2	143.3
780199	Unwrought lead, nes	0.3	0.2	0.3	65.8
731300	Barbed wire of iron or steel	0.3	0.4	0.2	129.8
382200	(Prepared) diagnostic/laboratory reagents & certified	0.3	0.3	0.3	112.9
520411	Sewing thread, >=85% cotton	0.3	0.2	0.1	78.7
630229	Printed bedlinen, nes	0.3	0.2	0.1	67.0
6403XX	Footwear, rubber/plastic soles & leather uppers, nes	0.3	0.3	0.2	105.9
060290	Live plants & mushroom spawns	0.3	0.8	0.2	290.3
630510	Sacks & bags of jute & bast fibres for packing	0.3	0.3	0.2	98.9
080720	Papayas, fresh	0.3	0.1	0.2	23.7
491110	Trade advertising material, commercial catalogues & the like	0.3	0.6	0.1	219.3
960190	Worked bone	0.3	0.2	0.1	91.2

HSIC Code	Product	Export potential (Millions $)	Actual exports (Millions $)	Untapped potential remaining in (Millions $)	Performance
392020	Non-cellular ethylene polymers, in flat shapes	0.2	0.4	0.2	143.4
480524	Testliner "recycled liner board", uncoated, >36x15cm,	0.2	0.2	0.2	74.2
392321	Sacks & bags, of ethylene polymers	0.2	0.3	0.1	134.2
1212Xb	Fruit stones & kernels for human consumption, sugar cane,	0.2	0.2	0.2	92.6
090121	Coffee, roasted, not decaffeinated	0.2	0.3	0.1	135.2
020230	Bovine cuts boneless, frozen	0.2	0.2	0.2	75.1
330491	Make-up/skin care powders	0.2	0.1	0.2	33.1
761699	Articles of aluminium, nes	0.2	0.3	0.2	140.7
420211	Trunks, suitcases, school satchels & similar containers, leather	0.2	0.1	0.2	54.1
090190	Coffee husks & skins; coffee substitutes	0.2	0.1	0.2	51.8
940360	Wooden furniture, nes	0.2	0.3	0.1	135.4
170191	Refined cane or beet sugar	0.2	0.2	0.2	95.5
152190	Beeswax, other insect waxes & spermaceti	0.2	0.2	0.2	86.0
490199	Printed books, brochures & similar, nes	0.2	0.6	0.2	296.4
	Total	**2,427**	**1,494**	**1,256**	**62**

Data source: ITC Export Potential Map, exportpotential.intracen.org

Table A8 List of products for export diversification according to the RCA (Atlas)

Code	Name_18	World trade bn	RCA	Distance	PCI	Oppor tunity gain	Index	Sector
3924	Plastic household articles	18.400	0.997	0.177	0.496	0.320	0.498	Chemicals
0102	Bovine	9.300	0.994	0.180	0.497	0.328	0.500	Agriculture
1211	Plants used in perfumery, pharmacy or insecticide	3.140	0.985	0.241	0.236	0.039	0.375	Agriculture
7314	Cloth of iron or steel wire	5.250	0.984	0.168	0.569	0.469	0.548	Metals
1201	Soya beans	56.600	0.972	0.174	0.314	0.217	0.419	Agriculture
7112	Scrap of precious metal	16.700	0.971	0.173	0.493	0.346	0.496	Stone
1401	Vegetable materials used for plaiting	0.184	0.928	0.165	0.370	0.221	0.421	Agriculture
3921	Other plastic plates, sheets etc.	26.800	0.872	0.155	0.691	0.648	0.591	Chemicals
0408	Egg yolks	1.180	0.831	0.131	0.634	0.580	0.544	Agriculture
2710	Petroleum oils, refined	793.000	0.811	0.198	0.453	0.276	0.435	Minerals
2008	Fruits and nuts, otherwise prepared	16.400	0.809	0.220	0.360	0.133	0.381	Agriculture
8702	Buses	17.100	0.796	0.143	0.621	0.482	0.511	Vehicles
7001	Cullet and other scraps of glass	0.436	0.790	0.196	0.444	0.333	0.441	Stone
4817	Letterstock	1.010	0.775	0.163	0.562	0.477	0.494	Agriculture
3304	Make-up preparations	51.900	0.772	0.121	0.671	0.705	0.567	Chemicals
1604	Prepared or preserved fish	17.000	0.767	0.194	0.295	0.167	0.356	Agriculture

Code	Name_18	World trade bn	RCA	Distance	PCI	Oppor tunity gain	Index	Sector
0403	Fermented milk products	4.470	0.744	0.182	0.553	0.423	0.475	Agriculture
7610	Aluminum structures (bridges, towers etc)	13.000	0.727	0.143	0.637	0.548	0.514	Metals
0207	Poultry	25.500	0.722	0.149	0.572	0.472	0.479	Agriculture
1212	Seaweeds & edible vegetable products	1.040	0.712	0.218	0.265	0.099	0.323	Agriculture
4410	Particle board and similar board	9.170	0.697	0.162	0.586	0.435	0.470	Agriculture
0511	Animal products n.e.c.	2.800	0.683	0.209	0.384	0.243	0.380	Agriculture
7211	Flat-rolled iron, width < 600mm, not clad	5.180	0.679	0.128	0.646	0.638	0.523	Metals
7316	Anchors of iron or steel	0.235	0.672	0.141	0.530	0.351	0.423	Metals
4802	Paper used for graphic purposes	13.800	0.668	0.122	0.677	0.455	0.481	Agriculture
3402	Cleaning products	34.800	0.663	0.181	0.576	0.484	0.476	Chemicals
4910	Calendars	0.527	0.660	0.134	0.570	0.527	0.473	Agriculture
8609	Containers for multimodal transportation	9.670	0.660	0.111	0.524	0.162	0.364	Vehicles
6304	Other furnishing articles	4.590	0.654	0.158	0.414	0.270	0.374	Textiles
4103	Other raw hides and skins	0.467	0.649	0.231	0.219	0.110	0.302	Agriculture
3306	Dental hygiene products	5.480	0.645	0.150	0.576	0.499	0.467	Chemicals
9606	Buttons	1.680	0.641	0.123	0.553	0.445	0.440	Machinery
3003	Medicaments, not packaged	17.600	0.634	0.132	0.652	0.553	0.493	Chemicals
8705	Special purpose motor vehicles	13.300	0.630	0.146	0.571	0.477	0.456	Vehicles
2806	Hydrochloric acid	0.295	0.623	0.156	0.575	0.438	0.448	Chemicals
0906	Cinnamon	0.645	0.617	0.148	0.319	0.181	0.316	Agriculture
8459	Machine tools for drilling by removing metal	3.620	0.613	0.107	0.801	0.863	0.596	Machinery
0604	Other parts of plants	1.290	0.608	0.205	0.418	0.214	0.361	Agriculture
7117	Imitation jewelry	6.400	0.595	0.100	0.643	0.558	0.474	Stone
8429	Self-propelled bulldozers, excavators &road rollers	47.000	0.589	0.110	0.694	0.736	0.532	Machinery
1901	Malt extract	22.200	0.588	0.179	0.552	0.425	0.436	Agriculture
9015	Surveying instruments	8.480	0.588	0.133	0.552	0.514	0.447	Machinery
6402	Other footwear of rubber or plastics	34.100	0.588	0.124	0.379	0.267	0.339	Textiles
5501	Synthetic filament tow	1.280	0.587	0.133	0.584	0.498	0.451	Textiles
3506	Glues and adhesives	12.100	0.558	0.109	0.761	0.842	0.568	Chemicals
8426	Ships' derricks; cranes	14.100	0.554	0.122	0.592	0.631	0.475	Machinery
8430	Other moving, excavating or boring machinery	11.000	0.554	0.129	0.483	0.519	0.421	Machinery
4911	Other printed matter	10.700	0.550	0.155	0.655	0.619	0.495	Agriculture
3211	Prepared driers	0.245	0.541	0.149	0.544	0.458	0.423	Chemicals
8714	Parts of motorcycles or wheelchairs	18.900	0.537	0.097	0.707	0.598	0.485	Vehicles
2205	Wine, flavored	0.540	0.534	0.133	0.549	0.458	0.419	Agriculture
1902	Pasta	9.560	0.528	0.190	0.394	0.216	0.332	Agriculture
1519	Stearic acid	9.090	0.511	0.139	0.499	0.346	0.374	Agriculture

Code	Name_18	World trade bn	RCA	Distance	PCI	Oppor tunity gain	Index	Sector
8522	Parts and accessories for video or sound equipment	1.990	0.508	0.080	0.742	0.526	0.464	Electronics

Data source: Atlas of Economic Complexity

Table A9 List of products for export diversification according to the distance indicator (Atlas)

Code	Name_18	World trade bn	RCA	Distance	PCI	Oppor tunity gain	Index	Sector
8522	Parts and accessories for video or sound equipment	1.990	0.508	0.080	0.742	0.526	0.464	Electronics
8714	Parts of motorcycles or wheelchairs	18.900	0.537	0.097	0.707	0.598	0.485	Vehicles
7117	Imitation jewelry	6.400	0.595	0.100	0.643	0.558	0.474	Stone
8459	Machine tools for drilling by removing metal	3.620	0.613	0.107	0.801	0.863	0.596	Machinery
3506	Glues and adhesives	12.100	0.558	0.109	0.761	0.842	0.568	Chemicals
8429	Self-propelled bulldozers, excavators and road rollers	47.000	0.589	0.110	0.694	0.736	0.532	Machinery
8609	Containers for multimodal transportation	9.670	0.660	0.111	0.524	0.162	0.364	Vehicles
3304	Make-up preparations	51.900	0.772	0.121	0.671	0.705	0.567	Chemicals
4802	Paper used for graphic purposes	13.800	0.668	0.122	0.677	0.455	0.481	Agriculture
8426	Ships' derricks; cranes	14.100	0.554	0.122	0.592	0.631	0.475	Machinery
9606	Buttons	1.680	0.641	0.123	0.553	0.445	0.440	Machinery
7211	Flat-rolled iron, width < 600mm, not clad	5.180	0.679	0.128	0.646	0.638	0.523	Metals
8430	Other moving, excavating or boring machinery	11.000	0.554	0.129	0.483	0.519	0.421	Machinery
0408	Egg yolks	1.180	0.831	0.131	0.634	0.580	0.544	Agriculture
3003	Medicaments, not packaged	17.600	0.634	0.132	0.652	0.553	0.493	Chemicals
9015	Surveying instruments	8.480	0.588	0.133	0.552	0.514	0.447	Machinery
5501	Synthetic filament tow	1.280	0.587	0.133	0.584	0.498	0.451	Textiles
2205	Wine, flavored	0.540	0.534	0.133	0.549	0.458	0.419	Agriculture
9033	Other parts for machines and appliances	2.740	0.502	0.133	0.720	0.642	0.499	Machinery
4910	Calendars	0.527	0.660	0.134	0.570	0.527	0.473	Agriculture
8702	Buses	17.100	0.796	0.143	0.621	0.482	0.511	Vehicles
7610	Aluminum structures (bridges, towers etc)	13.000	0.727	0.143	0.637	0.548	0.514	Metals
0906	Cinnamon	0.645	0.617	0.148	0.319	0.181	0.316	Agriculture
0207	Poultry	25.500	0.722	0.149	0.572	0.472	0.479	Agriculture
3211	Prepared driers	0.245	0.541	0.149	0.544	0.458	0.423	Chemicals
3306	Dental hygiene products	5.480	0.645	0.150	0.576	0.499	0.467	Chemicals
3921	Other plastic plates, sheets etc.	26.800	0.872	0.155	0.691	0.648	0.591	Chemicals
4911	Other printed matter	10.700	0.550	0.155	0.655	0.619	0.495	Agriculture
2806	Hydrochloric acid	0.295	0.623	0.156	0.575	0.438	0.448	Chemicals

Code	Name_18	World trade bn	RCA	Distance	PCI	Oppor tunity gain	Index	Sector
6304	Other furnishing articles	4.590	0.654	0.158	0.414	0.270	0.374	Textiles
4410	Particle board and similar board	9.170	0.697	0.162	0.586	0.435	0.470	Agriculture
4817	Letterstock	1.010	0.775	0.163	0.562	0.477	0.494	Agriculture
1401	Vegetable materials used for plaiting	0.184	0.928	0.165	0.370	0.221	0.421	Agriculture
7314	Cloth of iron or steel wire	5.250	0.984	0.168	0.569	0.469	0.548	Metals
7112	Scrap of precious metal	16.700	0.971	0.173	0.493	0.346	0.496	Stone
1201	Soya beans	56.600	0.972	0.174	0.314	0.217	0.419	Agriculture
3924	Plastic household articles	18.400	0.997	0.177	0.496	0.320	0.498	Chemicals
1901	Malt extract	22.200	0.588	0.179	0.552	0.425	0.436	Agriculture
0102	Bovine	9.300	0.994	0.180	0.497	0.328	0.500	Agriculture
3402	Cleaning products	34.800	0.663	0.181	0.576	0.484	0.476	Chemicals
0403	Fermented milk products	4.470	0.744	0.182	0.553	0.423	0.475	Agriculture
1902	Pasta	9.560	0.528	0.190	0.394	0.216	0.332	Agriculture
1604	Prepared or preserved fish	17.000	0.767	0.194	0.295	0.167	0.356	Agriculture
7001	Cullet and other scraps of glass	0.436	0.790	0.196	0.444	0.333	0.441	Stone
2710	Petroleum oils, refined	793.000	0.811	0.198	0.453	0.276	0.435	Minerals
0604	Other parts of plants	1.290	0.608	0.205	0.418	0.214	0.361	Agriculture
0511	Animal products n.e.c.	2.800	0.683	0.209	0.384	0.243	0.380	Agriculture
1212	Seaweeds & edible vegetable products	1.040	0.712	0.218	0.265	0.099	0.323	Agriculture
2008	Fruits and nuts, otherwise prepared	16.400	0.809	0.220	0.360	0.133	0.381	Agriculture
4103	Other raw hides and skins	0.467	0.649	0.231	0.219	0.110	0.302	Agriculture
1211	Plants used in perfumery, pharmacy or insecticide	3.140	0.985	0.241	0.236	0.039	0.375	Agriculture

Data source: Atlas of Economic Complexity

Table A10 List of products for export diversification according to the PCI (Atlas)

Code	Name_18	World trade bn	RCA	Distance	PCI	Oppor tunity gain	Index	Sector
8459	Machine tools for drilling by removing metal	3.620	0.613	0.107	0.801	0.863	0.596	Machinery
3506	Glues and adhesives	12.100	0.558	0.109	0.761	0.842	0.568	Chemicals
8522	Parts and accessories for video or sound equipment	1.990	0.508	0.080	0.742	0.526	0.464	Electronics
9033	Other parts for machines and appliances	2.740	0.502	0.133	0.720	0.642	0.499	Machinery
8714	Parts of motorcycles or wheelchairs	18.900	0.537	0.097	0.707	0.598	0.485	Vehicles
8429	Self-propelled bulldozers, excavators and road rollers	47.000	0.589	0.110	0.694	0.736	0.532	Machinery
3921	Other plastic plates, sheets etc.	26.800	0.872	0.155	0.691	0.648	0.591	Chemicals
8803	Parts of other aircraft	84.900	0.940	0.092	0.679	0.756	0.617	Vehicles
4802	Paper used for graphic purposes	13.800	0.668	0.122	0.677	0.455	0.481	Agriculture
3304	Make-up preparations	51.900	0.772	0.121	0.671	0.705	0.567	Chemicals
4911	Other printed matter	10.700	0.550	0.155	0.655	0.619	0.495	Agriculture

Code	Name_18	World trade bn	RCA	Distance	PCI	Oppor tunity gain	Index	Sector
3003	Medicaments, not packaged	17.600	0.634	0.132	0.652	0.553	0.493	Chemicals
7211	Flat-rolled iron, width < 600mm, not clad	5.180	0.679	0.128	0.646	0.638	0.523	Metals
7117	Imitation jewelry	6.400	0.595	0.100	0.643	0.558	0.474	Stone
7610	Aluminum structures (bridges, towers etc)	13.000	0.727	0.143	0.637	0.548	0.514	Metals
0408	Egg yolks	1.180	0.831	0.131	0.634	0.580	0.544	Agriculture
8702	Buses	17.100	0.796	0.143	0.621	0.482	0.511	Vehicles
8426	Ships' derricks; cranes	14.100	0.554	0.122	0.592	0.631	0.475	Machinery
4410	Particle board and similar board	9.170	0.697	0.162	0.586	0.435	0.470	Agriculture
5501	Synthetic filament tow	1.280	0.587	0.133	0.584	0.498	0.451	Textiles
3402	Cleaning products	34.800	0.663	0.181	0.576	0.484	0.476	Chemicals
3306	Dental hygiene products	5.480	0.645	0.150	0.576	0.499	0.467	Chemicals
2806	Hydrochloric acid	0.295	0.623	0.156	0.575	0.438	0.448	Chemicals
0207	Poultry	25.500	0.722	0.149	0.572	0.472	0.479	Agriculture
8705	Special purpose motor vehicles	13.300	0.630	0.146	0.571	0.477	0.456	Vehicles
4910	Calendars	0.527	0.660	0.134	0.570	0.527	0.473	Agriculture
7314	Cloth of iron or steel wire	5.250	0.984	0.168	0.569	0.469	0.548	Metals
4817	Letterstock	1.010	0.775	0.163	0.562	0.477	0.494	Agriculture
9606	Buttons	1.680	0.641	0.123	0.553	0.445	0.440	Machinery
0403	Fermented milk products	4.470	0.744	0.182	0.553	0.423	0.475	Agriculture
1901	Malt extract	22.200	0.588	0.179	0.552	0.425	0.436	Agriculture
9015	Surveying instruments	8.480	0.588	0.133	0.552	0.514	0.447	Machinery
2205	Wine, flavored	0.540	0.534	0.133	0.549	0.458	0.419	Agriculture
3211	Prepared driers	0.245	0.541	0.149	0.544	0.458	0.423	Chemicals
7316	Anchors of iron or steel	0.235	0.672	0.141	0.530	0.351	0.423	Metals
8609	Containers for multimodal transportation	9.670	0.660	0.111	0.524	0.162	0.364	Vehicles
1519	Stearic acid	9.090	0.511	0.139	0.499	0.346	0.374	Agriculture
0102	Bovine	9.300	0.994	0.180	0.497	0.328	0.500	Agriculture
3924	Plastic household articles	18.400	0.997	0.177	0.496	0.320	0.498	Chemicals
7112	Scrap of precious metal	16.700	0.971	0.173	0.493	0.346	0.496	Stone
8430	Other moving, excavating or boring machinery	11.000	0.554	0.129	0.483	0.519	0.421	Machinery
2710	Petroleum oils, refined	793.000	0.811	0.198	0.453	0.276	0.435	Minerals
7001	Cullet and other scraps of glass	0.436	0.790	0.196	0.444	0.333	0.441	Stone
0604	Other parts of plants	1.290	0.608	0.205	0.418	0.214	0.361	Agriculture
6304	Other furnishing articles	4.590	0.654	0.158	0.414	0.270	0.374	Textiles
1902	Pasta	9.560	0.528	0.190	0.394	0.216	0.332	Agriculture
0511	Animal products n.e.c.	2.800	0.683	0.209	0.384	0.243	0.380	Agriculture
6402	Other footwear of rubber or plastics	34.100	0.588	0.124	0.379	0.267	0.339	Textiles
1401	Vegetable materials used for plaiting	0.184	0.928	0.165	0.370	0.221	0.421	Agriculture
2008	Fruits and nuts, otherwise prepared	16.400	0.809	0.220	0.360	0.133	0.381	Agriculture
0906	Cinnamon	0.645	0.617	0.148	0.319	0.181	0.316	Agriculture
1201	Soya beans	56.600	0.972	0.174	0.314	0.217	0.419	Agriculture
1604	Prepared or preserved fish	17.000	0.767	0.194	0.295	0.167	0.356	Agriculture

Code	Name_18	World trade bn	RCA	Distance	PCI	Oppor tunity gain	Index	Sector
1212	Seaweeds & edible vegetable products	1.040	0.712	0.218	0.265	0.099	0.323	Agriculture
1211	Plants used in perfumery, pharmacy or insecticide	3.140	0.985	0.241	0.236	0.039	0.375	Agriculture
4103	Other raw hides and skins	0.467	0.649	0.231	0.219	0.110	0.302	Agriculture

Data source: Atlas of Economic Complexity

Table A11 List of products for export diversification according to the OPG (Atlas)

Code	Name_18	World trade bn	RCA	Distance	PCI	Oppor tunity gain	Index	Sector
8459	Machine tools for drilling by removing metal	3.620	0.613	0.107	0.801	0.863	0.596	Machinery
3506	Glues and adhesives	12.100	0.558	0.109	0.761	0.842	0.568	Chemicals
8803	Parts of other aircraft	84.900	0.940	0.092	0.679	0.756	0.617	Vehicles
8429	Self-propelled bulldozers, excavators and road rollers	47.000	0.589	0.110	0.694	0.736	0.532	Machinery
3304	Make-up preparations	51.900	0.772	0.121	0.671	0.705	0.567	Chemicals
3921	Other plastic plates, sheets etc.	26.800	0.872	0.155	0.691	0.648	0.591	Chemicals
9033	Other parts for machines and appliances	2.740	0.502	0.133	0.720	0.642	0.499	Machinery
7211	Flat-rolled iron, width < 600mm, not clad	5.180	0.679	0.128	0.646	0.638	0.523	Metals
8426	Ships' derricks; cranes	14.100	0.554	0.122	0.592	0.631	0.475	Machinery
4911	Other printed matter	10.700	0.550	0.155	0.655	0.619	0.495	Agriculture
8714	Parts of motorcycles or wheelchairs	18.900	0.537	0.097	0.707	0.598	0.485	Vehicles
0408	Egg yolks	1.180	0.831	0.131	0.634	0.580	0.544	Agriculture
7117	Imitation jewelry	6.400	0.595	0.100	0.643	0.558	0.474	Stone
3003	Medicaments, not packaged	17.600	0.634	0.132	0.652	0.553	0.493	Chemicals
7610	Aluminum structures (bridges, towers etc)	13.000	0.727	0.143	0.637	0.548	0.514	Metals
4910	Calendars	0.527	0.660	0.134	0.570	0.527	0.473	Agriculture
8522	Parts and accessories for video or sound equipment	1.990	0.508	0.080	0.742	0.526	0.464	Electronics
8430	Other moving, excavating or boring machinery	11.000	0.554	0.129	0.483	0.519	0.421	Machinery
9015	Surveying instruments	8.480	0.588	0.133	0.552	0.514	0.447	Machinery
3306	Dental hygiene products	5.480	0.645	0.150	0.576	0.499	0.467	Chemicals
5501	Synthetic filament tow	1.280	0.587	0.133	0.584	0.498	0.451	Textiles
3402	Cleaning products	34.800	0.663	0.181	0.576	0.484	0.476	Chemicals
8702	Buses	17.100	0.796	0.143	0.621	0.482	0.511	Vehicles
4817	Letterstock	1.010	0.775	0.163	0.562	0.477	0.494	Agriculture
8705	Special purpose motor vehicles	13.300	0.630	0.146	0.571	0.477	0.456	Vehicles
0207	Poultry	25.500	0.722	0.149	0.572	0.472	0.479	Agriculture
7314	Cloth of iron or steel wire	5.250	0.984	0.168	0.569	0.469	0.548	Metals
2205	Wine, flavored	0.540	0.534	0.133	0.549	0.458	0.419	Agriculture

Code	Name_18	World trade bn	RCA	Distance	PCI	Oppor tunity gain	Index	Sector
3211	Prepared driers	0.245	0.541	0.149	0.544	0.458	0.423	Chemicals
4802	Paper used for graphic purposes	13.800	0.668	0.122	0.677	0.455	0.481	Agriculture
9606	Buttons	1.680	0.641	0.123	0.553	0.445	0.440	Machinery
2806	Hydrochloric acid	0.295	0.623	0.156	0.575	0.438	0.448	Chemicals
4410	Particle board and similar board	9.170	0.697	0.162	0.586	0.435	0.470	Agriculture
1901	Malt extract	22.200	0.588	0.179	0.552	0.425	0.436	Agriculture
0403	Fermented milk products	4.470	0.744	0.182	0.553	0.423	0.475	Agriculture
7316	Anchors of iron or steel	0.235	0.672	0.141	0.530	0.351	0.423	Metals
1519	Stearic acid	9.090	0.511	0.139	0.499	0.346	0.374	Agriculture
7112	Scrap of precious metal	16.700	0.971	0.173	0.493	0.346	0.496	Stone
7001	Cullet and other scraps of glass	0.436	0.790	0.196	0.444	0.333	0.441	Stone
0102	Bovine	9.300	0.994	0.180	0.497	0.328	0.500	Agriculture
3924	Plastic household articles	18.400	0.997	0.177	0.496	0.320	0.498	Chemicals
2710	Petroleum oils, refined	793.000	0.811	0.198	0.453	0.276	0.435	Minerals
6304	Other furnishing articles	4.590	0.654	0.158	0.414	0.270	0.374	Textiles
6402	Other footwear of rubber or plastics	34.100	0.588	0.124	0.379	0.267	0.339	Textiles
0511	Animal products n.e.c.	2.800	0.683	0.209	0.384	0.243	0.380	Agriculture
1401	Vegetable materials used for plaiting	0.184	0.928	0.165	0.370	0.221	0.421	Agriculture
1201	Soya beans	56.600	0.972	0.174	0.314	0.217	0.419	Agriculture
1902	Pasta	9.560	0.528	0.190	0.394	0.216	0.332	Agriculture
0604	Other parts of plants	1.290	0.608	0.205	0.418	0.214	0.361	Agriculture
0906	Cinnamon	0.645	0.617	0.148	0.319	0.181	0.316	Agriculture
1604	Prepared or preserved fish	17.000	0.767	0.194	0.295	0.167	0.356	Agriculture
8609	Containers for multimodal transportation	9.670	0.660	0.111	0.524	0.162	0.364	Vehicles
2008	Fruits and nuts, otherwise prepared	16.400	0.809	0.220	0.360	0.133	0.381	Agriculture
4103	Other raw hides and skins	0.467	0.649	0.231	0.219	0.110	0.302	Agriculture
1212	Seaweeds & edible vegetable products	1.040	0.712	0.218	0.265	0.099	0.323	Agriculture
1211	Plants used in perfumery, pharmacy or insecticide	3.140	0.985	0.241	0.236	0.039	0.375	Agriculture

Data source: Atlas of Economic Complexity

Table A12 List of products for export diversification according to the composite indexOPG (Atlas)

Code	Name_18	World trade bn	RCA	Distance	PCI	Oppor tunity gain	Index	Sector
8459	Machine tools for drilling by removing metal	3.620	0.613	0.107	0.801	0.863	0.596	Machinery
3921	Other plastic plates, sheets etc.	26.800	0.872	0.155	0.691	0.648	0.591	Chemicals
3506	Glues and adhesives	12.100	0.558	0.109	0.761	0.842	0.568	Chemicals
3304	Make-up preparations	51.900	0.772	0.121	0.671	0.705	0.567	Chemicals
7314	Cloth of iron or steel wire	5.250	0.984	0.168	0.569	0.469	0.548	Metals
0408	Egg yolks	1.180	0.831	0.131	0.634	0.580	0.544	Agriculture
8515	Electric soldering machines	12.000	0.260	0.080	0.885	0.939	0.541	Electronics
8462	Machine tools for molding and forging metals	10.200	0.357	0.084	0.842	0.853	0.534	Machinery

Code	Name_18	World trade bn	RCA	Distance	PCI	Oppor tunity gain	Index	Sector
7211	Flat-rolled iron, width < 600mm, not clad	5.180	0.679	0.128	0.646	0.638	0.523	Metals
7315	Chain of iron or steel	5.150	0.359	0.101	0.793	0.837	0.523	Metals
8479	Machines n.e.c.	126.000	0.094	0.077	0.885	1.000	0.514	Machinery
7610	Aluminum structures (bridges, towers etc)	13.000	0.727	0.143	0.637	0.548	0.514	Metals
8702	Buses	17.100	0.796	0.143	0.621	0.482	0.511	Vehicles
8440	Bookbinding machinery	0.961	0.339	0.096	0.750	0.848	0.508	Machinery
3507	Enzymes	5.260	0.355	0.097	0.801	0.771	0.506	Chemicals
0102	Bovine	9.300	0.994	0.180	0.497	0.328	0.500	Agriculture
8207	Interchangeable tools for hand tools	23.400	0.055	0.079	0.859	1.000	0.498	Metals
8514	Industrial electric furnaces	5.370	0.067	0.091	0.883	0.949	0.498	Electronics
3924	Plastic household articles	18.400	0.997	0.177	0.496	0.320	0.498	Chemicals
7318	Screws and similar articles of iron or steel	40.100	0.082	0.083	0.825	0.995	0.496	Metals
7607	Aluminum foil < 0.2 mm	13.000	0.412	0.101	0.709	0.761	0.496	Metals
7112	Scrap of precious metal	16.700	0.971	0.173	0.493	0.346	0.496	Stone
4911	Other printed matter	10.700	0.550	0.155	0.655	0.619	0.495	Agriculture
4817	Letterstock	1.010	0.775	0.163	0.562	0.477	0.494	Agriculture
3003	Medicaments, not packaged	17.600	0.634	0.132	0.652	0.553	0.493	Chemicals
3403	Lubricants	10.100	0.173	0.098	0.795	0.903	0.492	Chemicals
8714	Parts of motorcycles or wheelchairs	18.900	0.537	0.097	0.707	0.598	0.485	Vehicles
3914	Ion-exchangers based on polymers	1.510	0.000	0.075	0.898	0.959	0.483	Chemicals
9031	Measuring instruments	46.600	0.030	0.072	0.874	0.949	0.481	Machinery
4802	Paper used for graphic purposes	13.800	0.668	0.122	0.677	0.455	0.481	Agriculture
0207	Poultry	25.500	0.722	0.149	0.572	0.472	0.479	Agriculture
8483	Transmission shafts	58.200	0.031	0.095	0.835	0.949	0.478	Machinery
9608	Pens	6.190	0.467	0.098	0.663	0.680	0.477	Machinery
3402	Cleaning products	34.800	0.663	0.181	0.576	0.484	0.476	Chemicals
0403	Fermented milk products	4.470	0.744	0.182	0.553	0.423	0.475	Agriculture
8481	Appliances for thermostatically controlled valves	90.600	0.005	0.090	0.862	0.944	0.475	Machinery
8209	Articles for utensils, of cermet	6.730	0.000	0.074	0.908	0.914	0.474	Metals
7117	Imitation jewelry	6.400	0.595	0.100	0.643	0.558	0.474	Stone
4910	Calendars	0.527	0.660	0.134	0.570	0.527	0.473	Agriculture
8419	Equipment for temperature change of materials	39.500	0.033	0.104	0.829	0.924	0.472	Machinery
8420	Calendering or other rolling machines, other than	1.490	0.063	0.080	0.900	0.842	0.471	Machinery
3004	Medicaments, packaged	346.000	0.408	0.139	0.691	0.646	0.471	Chemicals
4410	Particle board and similar board	9.170	0.697	0.162	0.586	0.435	0.470	Agriculture
6804	Grindstones	4.880	0.083	0.094	0.830	0.868	0.469	Stone

Code	Name_18	World trade bn	RCA	Distance	PCI	Oppor tunity gain	Index	Sector
9024	Machines for testing the mechanical properties of	2.500	0.103	0.082	0.868	0.822	0.469	Machinery
3910	Silicones in primary forms	8.360	0.051	0.082	0.857	0.883	0.468	Chemicals
8477	Machinery for working rubber or plastics	27.800	0.045	0.085	0.847	0.893	0.468	Machinery
3306	Dental hygiene products	5.480	0.645	0.150	0.576	0.499	0.467	Chemicals
9027	Instruments for physical or chemical analysis	44.700	0.010	0.083	0.840	0.929	0.465	Machinery
8522	Parts and accessories for video or sound equipme	1.990	0.508	0.080	0.742	0.526	0.464	Electronics
8482	Ball or roller bearings	33.300	0.084	0.090	0.834	0.837	0.461	Machinery
7225	Flat-rolled products of other alloy steel, width >	33.400	0.001	0.078	0.876	0.888	0.461	Metals
8413	Pumps for liquids	65.900	0.070	0.090	0.788	0.893	0.460	Machinery
8467	Tools for hand working, pneumatic, hydraulic mot	8.240	0.056	0.090	0.800	0.893	0.460	Machinery
9017	Drafting tables and machines	2.380	0.078	0.080	0.800	0.878	0.459	Machinery
9026	Instruments for measuring properties of liquids or	22.800	0.012	0.095	0.827	0.898	0.458	Machinery
8458	Lathes for removing metal	8.150	0.000	0.080	0.869	0.878	0.457	Machinery
7017	Laboratory, hygienic or pharmaceutical glassware	1.070	0.000	0.089	0.852	0.883	0.456	Stone
8705	Special purpose motor vehicles	13.300	0.630	0.146	0.571	0.477	0.456	Vehicles
9005	Binoculars and telescopes	1.330	0.204	0.105	0.764	0.751	0.456	Machinery
2920	Esters of other inorganic acids of nonmetals	1.640	0.000	0.086	0.832	0.893	0.453	Chemicals
9012	Microscopes, other than optical	3.100	0.144	0.082	0.840	0.741	0.452	Machinery
5910	Transmission belts or belting, of textile material	0.578	0.034	0.093	0.827	0.853	0.452	Textiles
8502	Electric generating sets and rotary converters	20.500	0.380	0.118	0.680	0.628	0.451	Electronics
5501	Synthetic filament tow	1.280	0.587	0.133	0.584	0.498	0.451	Textiles
3906	Acrylic polymers	16.900	0.042	0.094	0.823	0.842	0.450	Chemicals
8460	Machines with grinding stones for finishing metal	5.140	0.028	0.081	0.883	0.807	0.450	Machinery
8101	Tungsten (wolfram)	1.160	0.000	0.085	0.798	0.914	0.449	Metals
3908	Polyamides	16.300	0.001	0.101	0.815	0.878	0.449	Chemicals
8526	Radar	21.500	0.115	0.105	0.781	0.792	0.448	Electronics
2806	Hydrochloric acid	0.295	0.623	0.156	0.575	0.438	0.448	Chemicals
9015	Surveying instruments	8.480	0.588	0.133	0.552	0.514	0.447	Machinery
8442	Machinery for making printing components	1.560	0.170	0.112	0.713	0.792	0.447	Machinery
8454	Machines used in metallurgy	2.940	0.096	0.093	0.779	0.817	0.446	Machinery
8457	Machining centers for working metal	12.100	0.000	0.063	0.969	0.751	0.446	Machinery

Code	Name_18	World trade bn	RCA	Distance	PCI	Oppor tunity gain	Index	Sector
2925	Carboxyimide-function compounds	1.420	0.000	0.079	0.840	0.863	0.446	Chemicals
3810	Pickling preparations for metal surfaces	1.670	0.000	0.092	0.812	0.878	0.445	Chemicals
3922	Baths, sinks etc.	4.060	0.328	0.145	0.671	0.632	0.444	Chemicals
8208	Knives and blades for machines	3.100	0.000	0.090	0.806	0.878	0.444	Metals
7506	Nickel plates	1.350	0.008	0.089	0.832	0.842	0.443	Metals
3705	Photographic film, developed	1.540	0.000	0.060	1.000	0.710	0.443	Chemicals
8484	Gaskets and similar joints of metal sheeting	4.000	0.003	0.084	0.795	0.888	0.443	Machinery
8468	Machinery for soldering	1.040	0.148	0.115	0.721	0.782	0.441	Machinery
8466	Parts and accessories for metal working machines	20.400	0.005	0.096	0.805	0.858	0.441	Machinery
8505	Electromagnets	8.850	0.000	0.074	0.827	0.863	0.441	Electronics
7001	Cullet and other scraps of glass	0.436	0.790	0.196	0.444	0.333	0.441	Stone
9606	Buttons	1.680	0.641	0.123	0.553	0.445	0.440	Machinery
3303	Perfumes	18.400	0.425	0.134	0.628	0.574	0.440	Chemicals
8703	Cars	751.000	0.180	0.116	0.744	0.721	0.440	Vehicles
8202	Handsaws	4.400	0.054	0.085	0.750	0.868	0.439	Metals

Data source: Atlas of Economic Complexity

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